RAILROAD GAZETTE

FRIDAY, DECEMBER 30, 1898

CONTENTS.

ILLUSTRATIONS:	PAGE
The Performance of the Vauclain Compound Locomotive	927
The Lewiston & Queenston Suspension Bridge	929
Method of Testing Indicators	929
Rogers Locomotives on the Mobile & Ohio	931
The New Hawthorne Yard—Chicago, Burlington & Quincy	931
Criticism of English Railroad Signaling	931
The Glendon Tie Plate	934
CONTRIBUTIONS:	
An Engineering History of the Brooklyn Bridge	927
Events of the Year in the Traffic Field	932
EDITORIALS:	**PAGE**
The National Board of Trade	933
EDITORIAL NOTES	932, 933
New Publications	931
GENERAL NEWS:	
Locomotive Building	936
Car Building	936
Bridge Building	935
Meetings and Announcements	936
Personal	937
Elections and Appointments	937
Railroad Construction	938
Electric Railroad Construction	939
General Railroad News	939
Electric Railroad News	940
Traffic	940
MISCELLANEOUS:	
Technical	934
The Scrap Heap	935
John E. Wootten	927
Narrow Gage Locomotives on the Cauca Railway	928
Buying Under Specifications	929
Judge Knapp on the Present Status of the Law	930

Contributions.

An Engineering History of the Brooklyn Bridge.

New York, Dec. 21, 1898.

To the Editor of the Railroad Gazette:

The regret expressed by one of your correspondents that no complete record of the New York and Brooklyn Bridge has been published is one that all the constructing engineers sympathize with most heartily. It has been both an annoyance and a regret that to the frequent requests from foreign as well as domestic sources, official and other, for such a history, we were forced to reply by sending isolated reports on portions only of the work, supplemented in some cases by photographs of the same. Had such a history been published in proper form, and with full illustrations, the questions now arising would many of them never have been suggested, as they are largely the result of lack of proper information.

To prepare such a work now would be much more difficult and involve more expense than if it had been prepared soon after the opening of the bridge, and yet even at this late day it should be done. The many problems which were then worked out, and with permanent additions to the engineering knowledge of the world, are well worthy of description. The use of steel, for example, in a large way in structures was previously almost unknown, and its adoption in this structure marked the beginning of a development which has been revolutionary in its effects. Other and larger bridges may be built in the future, but the city should take pride in completing the record of this pioneer among the long-span bridges of the world.

There is one question that has been repeatedly asked me since the recent discussion about the bridge which I desire to answer, viz.: "Suppose the long stays which were attached to the masonry and to the trusses at the point of crippling had broken under the strain, what would have happened?" Let us look at the published side view of the long stays in question, and we shall see that they are at least 250 ft. long. Now, every wire of which they are composed was tested for both stretch and total strength. The requirements were that on 5-ft. lengths the stretch within the limits of elasticity should be 3½ per cent., and on 50-ft. lengths 2 per cent. Assuming the latter as the minimum, there would be on a length of 250 ft. 5 ft. of stretch, without the slightest detrimental change to the wire. It requires no argument to show that long before such an elongation could occur other parts of the structure would take up a portion of the load, and the stay would be relieved.

No engineer would now hold that this arrangement of stays is an ideal one, but it does not follow that the bridge is not absolutely safe for all legitimate uses.

F. COLLINGWOOD.

John E. Wootten.

Last week (page 922) we gave a brief note of the death of Mr. John E. Wootten, which took place in Philadelphia, the city of his birth, Dec. 16. We shall now undertake to give a somewhat more adequate sketch of the life of a man who was for many years active in the development of the mechanical engineering of railroads.

Mr. Wootten was born in 1822. His father, Captain Wootten, was identified with the merchant marine, but the son was attracted by the mechanical possibilities of the railroads, which were then in their early infancy. In 1837 he was by his own personal efforts apprenticed to Mr. Matthias W. Baldwin in a little shop in a by-street of Philadelphia. Mr. Baldwin completed in 1843 a locomotive for a railroad in Massachusetts and sent young Wootten to superintend the delivery and installation of this locomotive. On the completion in 1845 of the Beverly Railroad to Pottstown, 40 miles from Philadelphia, Mr. Baldwin was asked to recommend some one to take charge of the mechanical work at the terminus, and he selected Wootten for this position. Thus began Wootten's connection with the Reading Railroad, which ended only in 1886, when he resigned the office of General Manager.

About 1850 Mr. Wootten was established at Palo Alto, then, as now, the distributing point of the Schuylkill coal fields, where trains were made up for tidewater and line shipment. By 1853 Port Richmond had become the more important coal shipping point, and Mr. Wootten was transferred there, and there he remained until 1864, when he resigned, and, in partnership with the late William Mintzer, built at Pottstown a blast furnace, which was the origin of the large plant of the Pottstown Iron & Steel Company. In January, 1865, Mr. Wootten was persuaded to return to the service of the Reading Railroad and to take the superintendency of the Mine Hill & Schuylkill Haven Railroad. A year later he succeeded the late James Milholland as Master Mechanic of the Philadelphia & Reading Railroad Company, and shortly after the remodelling of the once famous Winans engines was begun, with which type the Reading was largely equipped. Shortly after this Mr. Wootten was made Assistant Superintendent and Engineer of Machinery under Mr. Franklin B. Gowan's administration, and in 1878 went to Philadelphia as General Manager of the road. About this time the well-known Wootten locomotive made its appearance. On the appearance of this type of firebox the great culm banks were attacked by washers and jigs to rescue from what was then a worthless accumulation of millions of tons of refuse the "buckwheat" coal, which became the standard fuel for the engines of this class. In 1886 Mr. Wootten retired from active life after a continuous service of 40 years.

Among his earlier inventions might be mentioned the steam gage, for which letters patent were granted in the early fifties, and which shortly after supplanted the safety levers with sliding weight and spring balance, still remembered by the earlier railroad men. These were made by Peter Clark at Reading and afterward at the old Schofield shop in Philadelphia. Other inventions were a hydraulic brake for passenger cars, heaters put underneath the car and a number of other appliances and tools.

Mr. Wootten was a liberal contributor to charities. Impressed by the fact that the great army of workmen with which he was so closely connected was bound to meet with accidents in spite of all precautions, he built at a cost of $25,000 a wing of the Reading Hospital and he cancelled a large mortgage on the Home for Widows and Single Women at Reading, Pa., and made many smaller gifts to the unfortunate.

He was a member of the American Philosophical Society for a number of years, and received at home and abroad medals and other recognitions of merit for his inventions. From the Paris Exhibition of 1879 and the National Exhibition of Railroad Appliances in 1883 he got gold medals for perfection and economy in locomotive practice. He received the John Scott medal for his mechanical achievements.

Mr. Wootten left a widow and two children, Mrs. A. W. Hoff and Mr. W. F. Wootten, now Engineer of Inspection for the Philadelphia & Reading Railroad Company.

The Performance of the Vauclain Compound Locomotive.

Prof. R. A. Smart, of Purdue University, presented a paper at the February meeting of the St. Louis Railway Club, entitled, "The Performance of a Four-Cylinder Compound Locomotive," which was published in our issue of March 4 last. This paper gave the results of certain tests with a stationary piece of apparatus at Purdue, consisting of the cylinders, moving parts and the first pair of driving wheels of a Vauclain compound locomotive. This model was illustrated in the Railroad Gazette of April 5, and Sept. 20, 1895, at which time the results of the first tests made were published. At the last meeting of the St. Louis Railway Club this paper was discussed by Mr. S. M. Vauclain, of the Baldwin Locomotive Works, and the rather remarkable performance obtained in the laboratory and reported by Prof. Smart was shown to be what actually takes place in service with this type of locomotive. That two investigators working independently should arrive at the same results when using different methods and different apparatus is quite important and gives the work of both an increased value. Mr. Vauclain illustrated his remarks by stereopticon views, some of which are reproduced. He said in part:

In April, 1896, we built for the Philadelphia & Reading two locomotives of the Atlantic type* under guarantee to haul eight cars, four coaches and four Pullmans, from Camden to Atlantic City, 55.5 miles, in 60 minutes, or six cars in 50 minutes. We estimated the maximum horse-power necessary at 1,400. Immediately following we built two other Atlantic type engines† for the Chicago, Milwaukee & St. Paul, to haul nine cars between Milwaukee and Chicago in one hour and 45 minutes, with the usual restrictions inside city limits. We estimated that the maximum horse-power required in this case was 1,600. With these two examples of high speed compounds the correctness of Prof. Smart's results can be demonstrated, as well as the superiority of this type of compound locomotive, for fast passenger service, over engines of other types.

The evaporate power necessary for the boilers was determined by the aid of the curves given in Fig. 1, which were deduced from actual diagrams and known consumption of water. It will be noticed that the compound has not only a much lower water rate per horse-power per hour than the single expansion engines, but has a greater range for economical work. This is due to the small variation in the water rate at various points of cut off. The upper curve is that of a single expansion engine, and it will be noticed that the lowest rate of water per horse-power is obtained at about one-fourth stroke, whereas in the compound the water rate is almost uniform for 50 per cent. of the stroke, the variation being not over two pounds. The ability to haul, if necessary, heavy loads at long cut off and at very high speed, is afforded by the great advantage in the valve motion. It will be seen from Fig. 2 that the steam and exhaust ports of this compound engine remain open so much longer than the ports of the single expansion engine, that it should need nothing further to demonstrate the absence of back pressure or excessive wire drawing in this type of locomotive, and this also explains why it is that the compound engines have a much greater rotative effect than a single expansion engine similarly employed. The upper lines of Fig. 2 are admission lines. The lower diagram gives the exhaust opening. It will be noticed that the broken line for the single expansion engine encloses not more than one-third the area of the full line, which is the low pressure exhaust on the compound engine.

Engine 1027 on the Philadelphia & Reading exceeded our guarantee about 10 per cent., and Engine 839, on the C., M. & St. P., exceeded the guarantee by four cars, hauling 13 cars, the train with locomotive and tender weighing 1,200,000 lbs., in the specified time. We immediately proceeded to make an accurate test of No. 1027 to discover just what the engine would do, we having apparently underestimated the power of both of these engines.

Our first effort was to determine the resistance of the modern passenger train at high speeds, and found it to be as shown in Fig. 3. We devoted several days to this, taking about three diagrams per mile, and from these data produced the curve given, upon which all our high speed estimates are now based. The resistance given by Clark's formula is considerably in excess of that of the Engineering News—about 50 per cent.—whereas the Engineering News formula gives results slightly in excess of ours. The last two lines are close enough to indicate that Barnes was correct in his determination. The difference in the atmospheric influences would be sufficient, perhaps, to make the difference between the two lines. The line given by the Engineering News formula, however, is a perfectly safe line for anyone to follow in calculating the horse-power necessary for a locomotive to do a certain prescribed work.

We also found that the horse-power increased in a direct proportion to the speed, as per Fig. 4. This diagram was plotted from cards taken with the engine hauling a light winter train of six coaches. Up to 1,125 horse-power and 70 miles per hour the line shows no inclination to curve, and if the reverse lever had been dropped a notch the effect would have been even more pronounced; with an experimental train of 12 coaches it was found that the horse-power increased directly with the speed up to 1,450 horse-power at 70 miles per hour. Even at this speed the engine had a reserve power to overcome grade resistance or to enable it to accelerate the train to a higher speed, as is shown by Fig. 5. The curve at the commencement of this diagram is due to throttle opening, the throttle being partially closed at that time.

I have a few diagrams showing the conformance of the work in both laboratory and road service. Fig. 6 shows the relation between horse-power and speed; the work if 1027 has been reduced to an equivalent of the Purdue model and the variation between the lines is due to the higher steam pressure in the cylinders of 1027. It is noticeable how closely the lines at 56 per cent. and 57.5 per cent. cut-off correspond. The two broken lines are the lines prepared by Prof. Smart at Purdue. The lower one is for 57½ per cent. cut-off, and the nearest we have to it is the 56 per cent. cut-off, which is the full line shown immediately above. The vertical distance at the left hand corner of the diagram is about three full spaces, whereas at the upper end it is nearly 3½ full spaces. This slight variation in the line of No. 1027 is probably due to the fact that

*An illustrated description was published in the Railroad Gazette June 19, 1896, together with a profile of the road and data as to the requirements of the service.

†For dimensions, see Railroad Gazette July 24, 1896.

the engine is a larger machine and the valve motion better perfected than the one we sent to Purdue, but the diagram clearly shows that the results obtained at Purdue are actually carried out in practice.

Regarding the steam consumption in pounds per indicated horse-power per hour shown by Fig. 7, there is no doubt that some miscarriage of justice has distorted the line for 61.1 per cent. cut off. It could not from our standpoint get into this shape, but should more clearly conform to the curve for 55.5 per cent. cut-off. It should be noticed that the indicated rate for Engine 1027 at 56 per cent. cut-off varies from 15.5 pounds to 16 pounds, at speeds of 280 to 100 revolutions per minute, and that the locomotive is not a

Fitchburg road, were guaranteed to haul a train of coaches weighing 325 tons on a 60-foot grade, with curves in combination with the grade. The compound engine hauled its specified train, attaining an average speed of 36 miles an hour, which would be equivalent to 40 miles on a straight track, and at one time reached 42 miles where the track was straight. The simple engine reached a speed of about 33 to 34 miles per hour for nearly two-thirds of the distance, when the speed suddenly slackened. We found the cause to be the inability of the fireman to get coal into the firebox fast enough.

For further data on the subject of what Vauclain four-cylinder compound engines are capable of doing at similar speeds. The divergence of the two is what might be expected, due to the compounding of the engine.

It is known to the speaker that if the valve motion on a single expansion engine and the valve motion on the compound engine is properly worked out, that the line showing the increase of horse-power as compared with the increase of speed will be a straight line in all cases, and that the line will go straight until you get at the limit of endurance of the engine at which it is possible to run, or to rotate, carrying the load you have behind it. In other words, if you put a locomotive on a grade with a certain train behind it, and open your throttle wide,

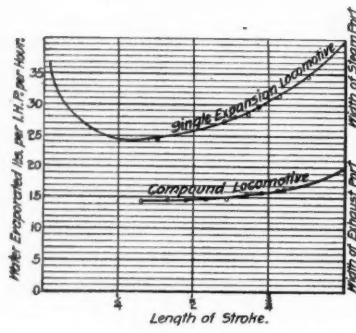


Fig. 1.—Water Curves of Compound and Single Expansion Locomotives.

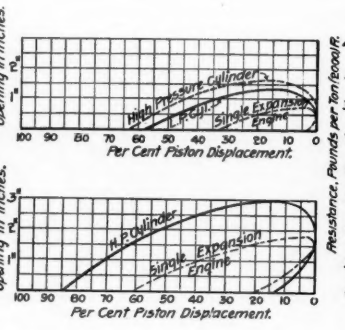

Width of Steam Port Opening in Inches.
High Pressure Cylinder.
Single Expansion Engine.
Per Cent Piston Displacement.
Width of Exhaust Port Opening in Inches.
H.P. Cylinder.
Single Expansion Engine.
Per Cent Piston Displacement.

Fig. 2.—Port Openings for Varying Piston Displacements at Running Cut-off for Vauclain Compound and Single Expansion Engines.

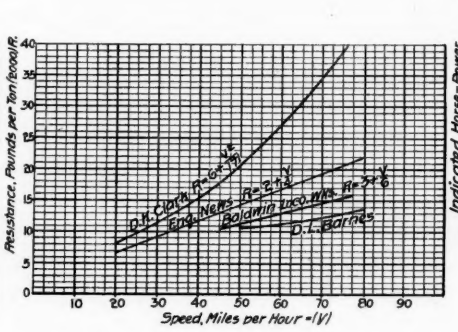


Fig. 3.—Train Resistance for Different Speeds.

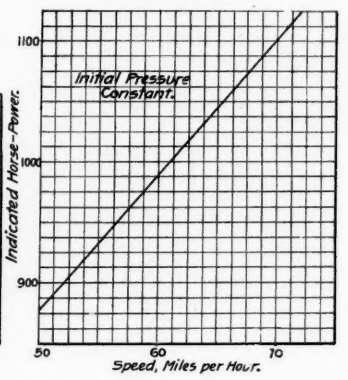


Fig. 4.—Relation of Speed and Horse-Power. Vauclain Compound No. 1,027.

Vauclain on the Compound Locomotive.

condensing engine. I believe the lines above represent the actual measure of water consumed, whereas the lower line is simply the indicated water rate, and as we account for about 83 per cent. of all the water consumed by the indicator diagrams, the actual water rate would be between 19 and 20 pounds. This drop in water rates from what has been given by the Purdue model is not due to any inaccuracy of the Purdue work, but to the higher steam pressure of the larger engine, giving a better opportunity for more economical results.

As the data shown establishes the superiority of the cylinder and valve arrangement of 1027, it is proper to explain that the Purdue model was built merely to show the system, and does not represent the best arrangement of this type of locomotive. The cylinders were taken from a logging engine, which was among the first engines of this type built. The 1027 is almost modern in its proportions. I say

I will refer to articles written by me and printed in the Railroad Gazette of March 19, 1897, explaining how the Chicago, Milwaukee & St. Paul compound hauled its train; also of July 29, 1898, page 546, the latter article being an analysis of the opening run on the Atlantic City road, where 55.5 miles were made in 45 minutes, and containing all the figures necessary to carry conviction to the most sceptical of the superiority of the four-cylinder compound in high-speed express passenger service.

In making the comparison of the compound engine with the ordinary expansion engine, the results obtained at Purdue are strictly true of the single expansion engine which was tested at Purdue,** but I consider it my duty to make this statement, that we have a great many modern single expansion engines which will show a very much better diagram than the single expansion diagram obtained at Purdue. Fig. 8 shows such a diagram of a single expansion

and put your reverse lever forward as far as possible, you can run as fast on that grade as your boiler will supply steam.

As the compound engine, as I have already shown, uses considerable less water, from 15 to 25 per cent. than single expansion engines, that in itself is a measure of economy which any railroad manager should expect to obtain, but, besides that, an additional economy will be obtained by an increase of evaporation. There is a saving of coal from the fact that not so much coal need be burned on the same grate surface. This is borne out by the results of a series of experiments shown by Fig. 9. As the coal burned per square foot of grate surface increases, the evaporation at 212 degrees decreases, and at the consumption of 100 pounds of coal per square foot of grate surface, the rate of evaporation is about 6½ pounds of water per pound of coal, whereas if the coal consumption runs up to 180 pounds the evaporation falls to about 5 pounds of water. If the evaporation is 25 per cent. less in a compound locomotive than in a single expansion locomotive, it follows that there is an increased water evaporation from the coal burned, and consequently not only is 25 per cent. less coal consumed, but an additional amount, due to better evaporation; so where the water saving is 25 per cent. the coal saving is 35 per cent., or where you save 10 per cent. of water you save probably 15 per cent. of coal, and so on in that proportion.

In conclusion, I will merely state that compound locomotives are not an experiment any longer. We have the four-cylinder and the two-cylinder compounds. We build both kinds, but up to the present time the four-cylinder compound seems to have outnumbered all the others. We have over a thousand of these locomotives in service now, and this year we shall build fully 300 more.

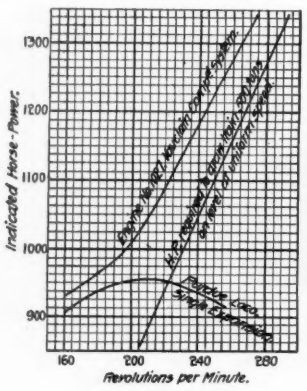


Fig. 5.

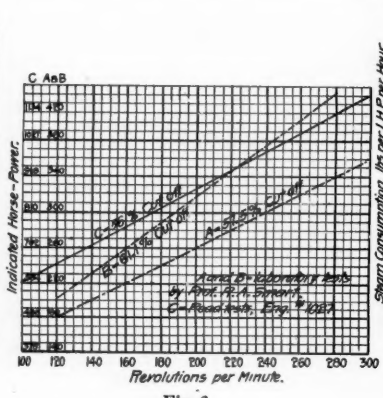


Fig. 6,

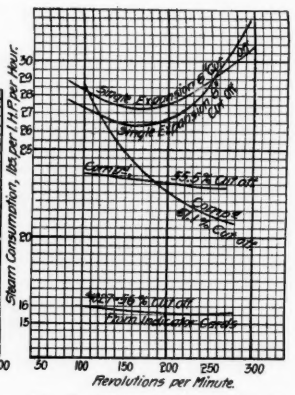


Fig. 7.—Steam Consumption at Various Speeds.

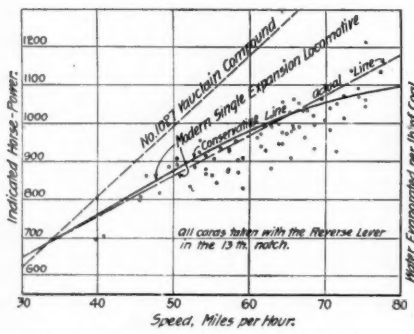

Indicated Horse-Power.
No. 1027 Vauclain Compound
Modern Single Expansion Locomotive
Actual "Line"
"Compromise Line"
All cards taken with the Reverse Lever in the 13 th. notch.
Speed, Miles per Hour.

Fig. 8.—Performance of a Modern Single Expansion Locomotive.

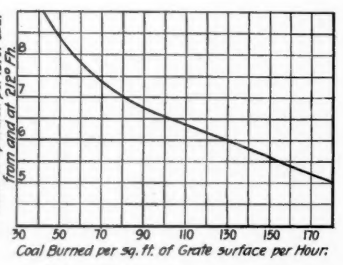


Fig. 9.—Effect of Varying Rates of Combustion.

Vauclain on the Compound Locomotive.

almost modern, as improvements are being constantly and carefully made in order to exceed results heretofore obtained. The latest designs are the compound locomotives for the Fitchburg‡, some similar single expansion engines being built at the same time.

The first six engines, with 28 square feet of heating surface and 78-inch driving wheels, built for the

were abandoned for the time being, and the line laid down in strict conformity to the results as he plotted them out, we would have the lower line, which I constructed myself by taking the average of certain cards, and that is practically a straight line. I give the line on the left hand upper margin showing the line produced by the No. 1027, hauling a similar train

locomotive used in high speed express service. I can safely present it, as I did not build the engine myself. It is not one of our build, but it shows what can be built, and what we do build every day. The full line is the one laid down by the engineer who made the experiments. The line is only a curve, because the conservatism of the engineer would not permit him to take into consideration certain cards which he feared were too good. If that conservatism

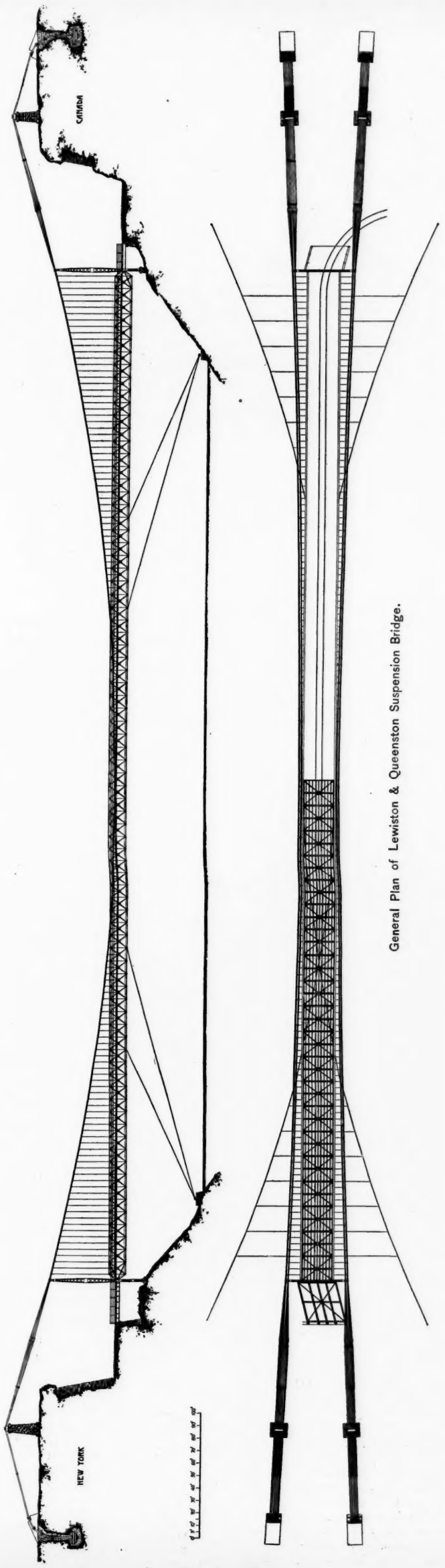
‡See Railroad Gazette, Oct. 21, 1898, for illustrations and dimensions.

**The tests referred to were made with the first locomotive at Purdue, and were reported by Prof. Goss, May 19, 1896, to the Western Railway Club.

Narrow Gage Locomotive for the Cauca Railway.

The Baldwin Locomotive Works has just built a small 12 x 16 in. narrow gage (3-ft.) locomotive for the Cauca Ry., United States of Colombia, from designs made by Mr. M. N. Forney, of New York. This engine has six 33-in. driving wheels and a pair of 24-in. trailing wheels, weighs about 48,000 lbs. and has a straight boiler 40 in. in diameter at the front end; the firebox is 36 by 36 in. inside measurements. The sharpest curves on this road have 200 ft. radii, the rails weigh 30 and 40 lbs. per yd., and it was required of the designer that the wheel base of this engine should not exceed 16 ft., 42,000 lbs. should be the adhesive weight, and the tank should have a capacity for 1,000 gals. of water and one cord of wood. These requirements were more than met in the engine built, which is a modification of the well-known Forney type.

The driving wheel base was made 6 ft. 3 in., and the engine wheel base 11 ft. 2 in., a pony truck being placed below the footboard and close to the back end of the firebox; the tank was placed on a separate frame and mounted on a single 4-wheel swivel truck of ordinary construction. The two middle channel bars of the tender frame were extended forward under the footboard and attached to a center pin directly over the pony truck axle. The design provides a very compact arrangement of the various parts and still allows great flexibility in both horizontal and vertical planes. All the weight of the engine excepting about 6,000 lbs. is carried on the driving wheels.



General Plan of Lewiston & Queenston Suspension Bridge.

The Lewiston & Queenston Suspension Bridge.

We published last week, page 913, a brief description of the new suspension bridge building across the Niagara River near Lewiston, N. Y. We have now received a drawing from the New Jersey Steel & Iron Company, contractors, which shows the general design and construction of the bridge. The engravings tell about all that there is to be told now about this structure. It will be noticed that it is built without stays, thus conforming to the views of many of the gentlemen who have recently written about the New York and Brooklyn Bridge. It will be noticed also that the cables are spliced for a considerable length at either end with eyebars. This was done, as we explained last week, because the cables taken from the upper suspension bridge at Niagara Falls were not long enough to carry the whole length of the span and yet were long enough and good enough to be used so far as they would go.

The peculiar location of this bridge, by which the towers are founded so much higher than the landings, permits and requires a novel construction, namely, the use of the rocker bents at each end of the stiffening truss. These bents support the cables at that point. They are hinged at the shoe, at the end of the truss, and at the top, and they act in themselves as towers.

The principal dimensions of the bridge and of these bents can be taken off the engraving. The bridge is 1,040 ft. between towers and 800 ft. between rocker bents and 28 ft. wide between trusses. Mr. R. S. Buck, who was Resident Engineer for the Grand Trunk steel arch and the Clifton steel arch at Niagara, is the Chief Engineer of this bridge, and Mr. L. L. Buck, who was Chief Engineer of those arches, is the Consulting Engineer for the Lewiston bridge. We have not been informed who is responsible for the general design and the details of the new bridge, but we have no doubt that either one of the Bucks is perfectly willing to assume all the responsibility.

Buying Under Specifications.

This subject is again brought up by a paper before the November meeting of the Northwest Railway Club by Mr. Alfred Lowell, Assistant Superintendent of Motive Power of the Northern Pacific. Mr. Lowell advocates buying under specifications, as shown by his conclusions, which are as follows:

1. Specifications are mutually advantageous to the buyer and to the reliable seller in expediting business and avoiding misunderstandings.

2. For all important material it is essential for safety and economy to purchase under specification, and that all details and tests prescribed should be insisted upon in order to maintain the standard of quality desired.

3. For unimportant material it is in general economy to purchase under specification, and all particulars specified should be required fulfilled, but with such articles occasional tests at unstated intervals, with thorough inspection, will generally be sufficient to maintain the quality.

4. The character of the specification and the nature of the tests prescribed should be adapted to insure the qualities requisite for the service in which the article is to be used, and qualities not essential should not be required.

5. The severity of the tests should be in accordance with the importance of the article in case of failure, viz.: More severe than actual service conditions on material in which a failure would be disastrous, but as light as the conditions will allow in other cases.

6. The manufacturer's methods and possibilities must be considered, and tests must only be prescribed that can be met with certainty when proper case is exercised without unnecessarily increasing the cost of manufacture.

7. Destroy as limited a quantity of finished material as is necessary to establish the quality.

8. A guarantee is an excellent supplement to a specification, but cannot in general forego the necessity of tests.

9. Specifications thus prepared should not increase the cost for any standard of quality, and the quality desired is assured.

Methods of Testing Indicators.*

The apparatus used for testing indicators at ordinary pressures above the atmosphere is shown in Fig. 1. The indicator is placed at A on top of the cylinder B. The cylinder B is made of a piece of 6-in. standard pipe about 2 ft. long. The pressure is measured by means of a plug and weight device, C, which is spun around so as to eliminate the effect of friction. The bottom of the plug is at the same level as the pipe D. The U-shaped pipe E is filled with oil. Before starting to calibrate the indicator the pet-cock F is opened slightly, in order to allow any air in the pipe G and the siphon H to escape. The siphon H is surrounded by water contained in the vessel I, which condenses the steam which enters it through the pipe D, so that when all the air present is allowed to escape through the pet-cock F, the pipe G and the siphon H will be filled with water. J is a pet-cock for removing any water that may collect at the bottom of the siphon E, after the apparatus has been in use for a long time. The pressure is adjusted by regulating the amount of opening of the valve K in the supply pipe I, which furnishes steam, water, or compressed air to the apparatus, and also by adjusting the valve M in the escape pipe N. O is a valve for removing any water which may collect in the bottom of the cylinder B when steam is used, and for draining out the water after calibrating an indicator under hydrostatic pressure. The pan of the plug and weight device C is limited in its movement by means of a fork which comes in contact with it only when the pan is in the extreme position; the two prongs of this fork are shown in section at P and Q. R is a gage for showing the approximate pressure. The readings of the gage R are not used in testing the indicator, but as general guide in the use of the apparatus. The diameter of the plug in the plug and weight device C is 0.5 in., and the hole in the bushing, 0.5005 in. Both the plug and bushing are ground true. The average area of the plug and of the hole in the bushing is used in calculating the weight required for a given pressure.

In testing indicators with steam pressure, the steam is brought to the maximum pressure to which the indicator is to be subjected; the indicator cock is then opened and closed quickly a number of times, in order to heat the indicator. The steam is then released from the cylinder B, and the atmospheric line is taken after turning the indicator cock to the proper position.

An apparatus for testing at pressures higher than can be carried on the boilers is shown in Fig. 2. It consists of a pipe A, 4 in. in diameter and about 8 ft. long, placed in a slanting position, and arranged so that the lower end, from B to C, can be heated by means of Bunsen burners. The pipe D is connected to both a water and steam supply. Water is first admitted through the valve E, until it nearly fills the gage glass F, after which steam is admitted, and the water in the pipe A is heated, and the pressure, as indicated by the gage G, is brought to that of the entering steam. The valve E is then closed, and the pipe A is heated by means of the Bunsen burners until the desired pressure is obtained. The pipe H leads to a plug and weight device, similar to the one shown in Fig. 1. The indicator is placed at I. In the calibration the pressure is brought to slightly above the maximum, and is then adjusted by opening the valve J. The first line taken is for the highest pressure, and the pressure is diminished for taking the other lines of the diagram by adjusting the height of the flames of the Bunsen burners, and the amount of opening of the valve J. Two lines are taken for each pressure, in the same way as described for the apparatus shown in Fig. 1. K is a screen for confining the heat to the lower end of the pipe A. The upper end of the pipe A is incased with a non-conducting covering, to diminish the radiation. An asbestos shield is placed on top of the lower end of the pipe to partly confine the flames of the Bunsen burners and thus render them more effective.

The apparatus used in testing springs used under a vacuum is shown in Fig. 3. The indicator is attached at A to the top of the horizontal cylinder E. The pipe B leads to a vacuum chamber and pump, and slopes downward, so that no water can collect in it. The amount of vacuum is regulated by adjusting the valve C, leading to the air pump,

*From a paper by Prof. D. S. Jacobus at the last meeting of the American Society of Mechanical Engineers.

and by admitting a small amount of air through the pet-cock D. The vacuum gage at F is graduated in inches of mercury and in pounds per square inch. G is a chamber for condensing any steam which may pass through the valve I, and thus prevent it from condensing on top of the mercury in the gage F. The water which collects in G is drawn off through the pet-cock H. The height of the mercury cup S is adjusted by means of the screw U, so that the surface of the mercury is on the same level as the zero point of the scale. There is a straight edge in front of the mercury cup S, at the same level as the zero of the scale, which makes it easy to adjust the level of the mercury to the proper height.

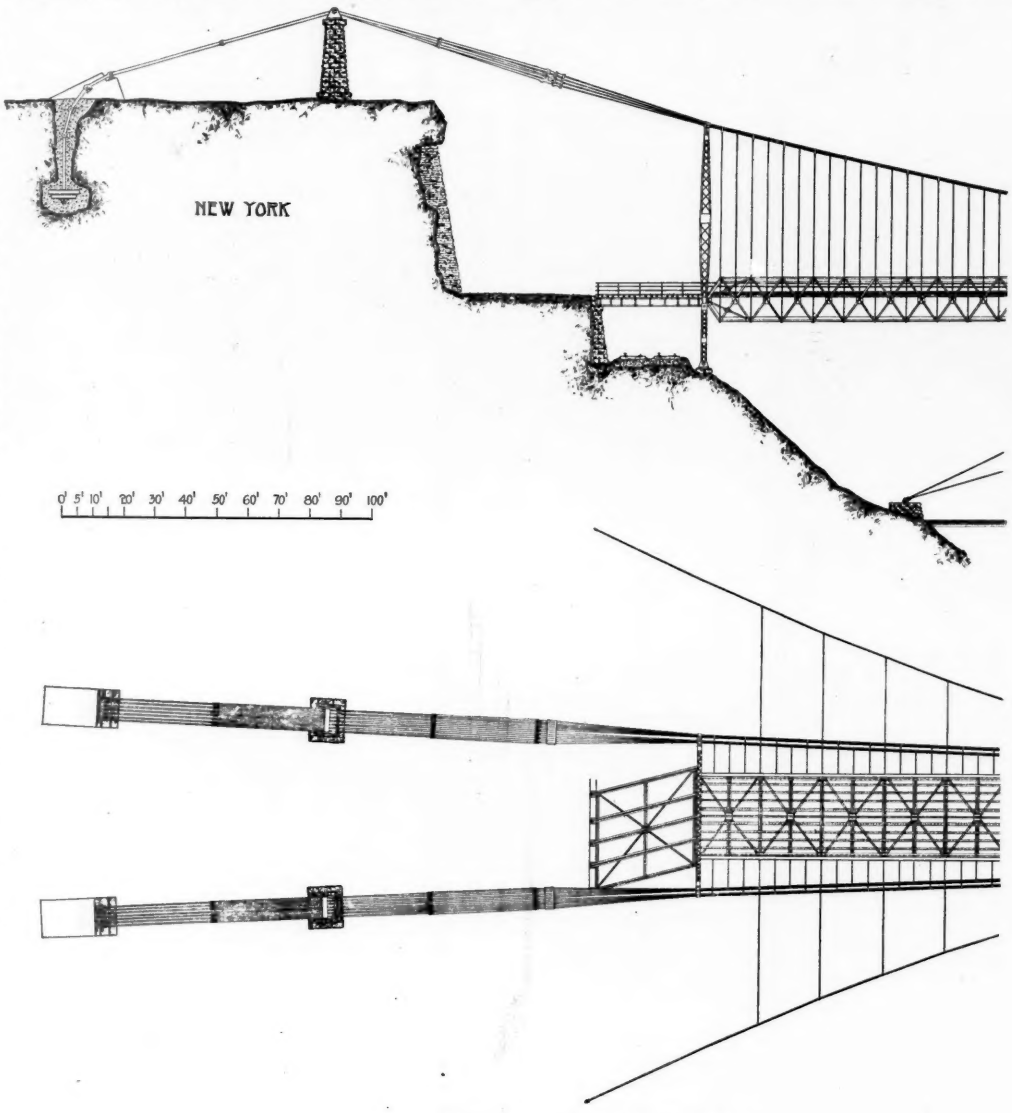
The apparatus may also be used for testing springs at pressures up to 15 lbs. above the atmosphere, the mercury column R being used for this purpose. Where a spring is used for both a slight pressure and a vacuum, the entire calibration can, therefore, be made with the apparatus shown in Fig. 3.

In measuring a pressure above the atmosphere, the valve I is closed and the valve J opened. The pressure of the steam acts then on the water contained in the U-shaped pipe N, and is transmitted through the hose connection P to the water in the upper part of the closed bottle Q. The lower part of the bottle Q is filled with mercury, and when the pressure increases this mercury is forced upward in the column R. The height of the bottle Q is adjusted by means of the screw T, so that the mercury is brought opposite the zero line of the scale, a straight edge being used in the front of the bottle, at the same level as the zero line of the scale, as in the case of the vacuum gage F. In adjusting the bottle Q up and down, the glass tube forming the column moves up and down with the bottle; this tube bears directly against the scale on which the pressures are read. Should the pressure be accidentally raised to such an extent that the mercury will be blown out of the column, the mercury will pass through the rubber hose V into the bottle W.

In testing the indicator, it is first heated by means of steam, admitted through the valve K, until it attains what is considered to be about the average temperature to which it will be subjected in the test. Two lines are taken at each pressure, and all other details in making the tests are the same as have already been described.

Indicators should be tested both before and after they are used on an engine, or other trial. One object of testing the indicators before the trial is to make certain that there is no excess of friction, which, if present, will form double lines on the test diagrams. If double lines are found it is generally due to some irregular action of the spring, in either throwing the piston of the indicator out of line or in forcing it against the side of the cylinder.

A mercury column will often give incorrect results when used in testing an indicator with steam pressure, unless it is allowed to stand a long time at each pressure before taking a reading, on account of the fact that a considerable pressure is required to overcome the inertia of the mercury in the column if the latter is in motion, and there may be pulsations which will affect the result.



One End of the Lewiston & Queenston Suspension Bridge.

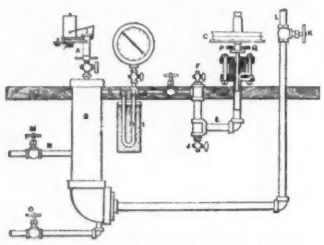


Fig. 1.—For Tests Between Atmospheric and Boiler Pressures.

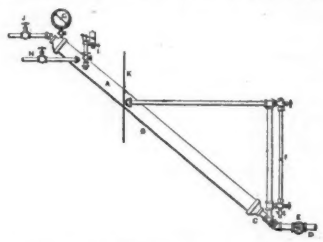


Fig. 2.—For Pressures Above Boiler Pressure.

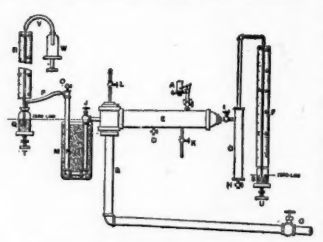


Fig. 3.—For Pressures Between Vacuum and 15 lbs. Above Atmosphere.

Apparatus for Testing Indicators, Designed by Professor D. S. Jacobus.

Judge Knapp on the Present Status of the Law.

Hon. Martin A. Knapp, Chairman of the Interstate Commerce Commission, on invitation of Prof. Emery R. Johnson, Dean of the Department of Transportation of the Wharton School of Commerce, at the University of Pennsylvania, Philadelphia, delivered a lecture to the classes there on the 14th of December, covering the relation of the Government to interstate commerce, and in the evening he further developed the subject at an informal talk to the Faculty. The constitutional power to regulate interstate commerce must either have a liberal interpretation or it must be denied all practical effect in meeting the unforeseen conditions of to-day. With the first constitutional warrant is coupled the added warrant of the implied power of regulation accompanying grants of eminent domain. The powers of government over common carriers might be rudely divided into those regulating the physical property and its operation, and those regulating the compensation for service rendered. Under the former head the details of regulation would be classified under four sub-heads: 1. Regulation of construction, on grounds of public policy. 2. Regulating the conditions and hours of labor. 3. Regulating the extent and kind of service. 4. Regulating the safety of passengers and employees. Various states have exercised the power to regulate the amount of construction, and in some cases have delegated to commissions the power to regulate the extent and kind of service to a limited degree. The National Government had only exercised the power of prescribing some of the conditions for safety.

As evidence of what had been done in this line, Mr. Knapp quoted statistics showing the decline in casualties to employees, due to enforcement of the coupler law. Regulation next related to the compensation for services rendered by the carrier to the public. The question arose, first, as to the absolute amount of compensation, and next as to the relative amount of compensation for different services. The method of regulation could be by controlling construction, which was of limited effect; by maintaining rates, which was also of limited effect, or by adjusting rates, which had unlimited effect. The courts have much curtailed the first scope of the office and tended to leave it in the anomalous position of standing for a remedy which it is powerless to apply. Meanwhile the conditions sought to be relieved have grown more general and more intense. In no country in the world is there such instability of transportation charges. Complaints as to the absolute rate are very infrequent, but the trouble is in the relative rates as between commodities, persons, places, markets. In England complaints of discrimination between individuals are unknown. The general thought has been that the Commission is clothed with certain judiciary authority, and also should act as a prosecutor, and even sometimes as a general detective. Either as prosecutor or court, its proper sphere is ignored. It is questionable if Congress is competent to set up an independent judiciary, but there can be no question as to its power to delegate to a commission its legislative functions of regulating interstate commerce, so far as it is affected by adjusting rates. This is more properly the function of such a commission. Its powers should extend to future acts, not merely to reviewing and awarding damages for the consequences of past acts. Departure from published rates should be a criminal cause. The railroad should continue to make the rates, but on complaint being filed the Commission should pass on the reasonableness and equity of rates. There should be no ex parte action, but notice of any proposed change of rates should be given to the carrier and every opportunity afforded for the statement of the carrier's side of the case. The speaker distinctly did not advocate the Commission's making rates at the present time, but only changing rates already made, when determined, on inquiry, to be unjust. He set these limits to the powers of a commission, not on constitutional grounds, but because it was the more reasonable, safe and natural thing to do, at least for some time to come.

The present law, both from the side of the railroad and of the public, has been deemed unsatisfactory; it visits the penalty on the individual and not on the corporation; and with the constitutional guarantee that no man may be compelled to incriminate himself it has fallen out that every man is called upon to testify as then safe from the operation of the law. The act is an attempt to combine the two principles of regulation and competition. On the one hand it requires publicity of rates, which makes sharp competition impossible. On the other hand it is designed to permit unlimited competition. It may be said to mark the first stage of the transition from the former notion of a railroad as an exclusive private property, to the larger notion of a public carrier, which passes on to the notion of a public highway. It is absolutely necessary to dissociate the functions of a railroad from those of an ordinary private enterprise. Much of the difficulty in regulating the existing gross evils arises from the hesitancy to view railroads in their proper light; while on the one hand the law fails to apply the proper regulations, on the other hand it avoids the co-ordinate and logical position of permitting pooling. There is an immense difference between trusts and railroads engaged in public service. The state recognizes the ill effects of trusts. It cannot regulate prices, so it essays to regulate combination. The railroad being thought of as in the same category, legislators attempt to apply the same principle there, and much of our legal exactment has been directed against consolidation as the means of regulating price. Finally, the largest hope for relief lies in the gradual advancement of business ethics, so that men will say "dishonorable" instead of "business enterprise" when one shipper gets a given service by a public carrier at the expense of his competitor. The principles on which an equitable rate was to be determined were not dwelt on, except to refer to the great complexity of the problem. Mr. Knapp distinctly avoided the questions of discrimination between commodities or markets, or places; that might be legitimate, but he intimated that the tendency was more and more to recognize the railroad charge as a tax, to be determined out of consideration of public policy. The first and great desideratum, however, is the certainty of that tax, and the speaker expressed the hope that the day was not far distant when rates would be as stable and public as the price of a postage stamp.

Rogers Locomotives for the Mobile & Ohio.

The Rogers Locomotive Company has lately built for the Mobile & Ohio 10 passenger engines, 10-wheelers, the particulars of which follow. An engraving of one of them, from a photograph, is shown herewith.

Rogers 10-Wheelers for the Mobile & Ohio.

Cylinders	18 x 26 in.
Drivers, diameter	62 in.
Driving wheel material	Cast steel
Driving axle material	Coffin steel journals
Driving wheel base	12 in.
Total wheel base	22 ft. 4 in.
Weight on drivers	102,000 lbs.
" " truck	28,000 lbs.
" " total	130,000 lbs.

Rogers Ten-Wheel Engine—Mobile & Ohio.

Heating surface—tubes	1,688.13 sq. ft.
" " firebox	156.73 sq. ft.
" " total	1,844.86 sq. ft.
Grate area	25.05 sq. ft.
Tubes	diameter, 2 in.; length, 13 ft.
" thickness	No. 11 B. W. G.; number, 248
" material	Iron
Grate	length, 108⅛ in.; width, 33⅜ in.
Boiler, type	Extended wagon top, radial stay
" diameter, outside front	60 in.
" material	Carbon steel
" working pressure	185 lbs. per sq. in.
" thickness of barrel	⅞ in.
" " " dome course	⅛ in.
" " " crown	⅜ in.
" " " tube	½ in.
" " " side	⅝ in.
Wheels—engine track, diameter	30 in.
" " " kind	Steel tired, spoke center
Tender, capacity	4,000 gals.
" frame	White oak; sills 5½ in. x 13 ft.
" wheels, diameter	33 in.
" " kind	Cast iron, double plates
Safety valves	2½ in.
Lubricators	No. 9 triple sight feed
Brakes	New York Air Brake Co.'s
Boiler covering	Magnesia sectional
Metallic packing	United States
Tires	Crucible
Sanding device	Leach's style A1
Injectors	Two No. 9 monitor
Springs	French
Brake beams	National hollow
Steam heat.	

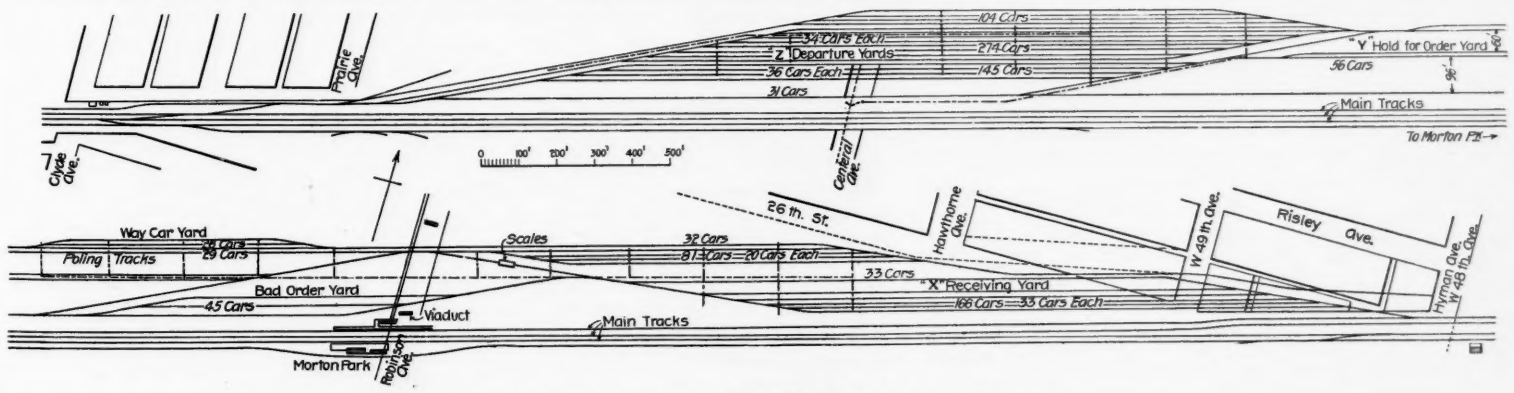
The New Hawthorne Yard—Chicago, Burlington & Quincy.

In our issue of Dec. 13, 1889, was given the plan of the Chicago, Burlington & Quincy freight yard, located on the south side of the three main tracks between Clyde and Hawthorne stations, seven miles out of Chicago. This yard is used for eastbound business, and has a total capacity of about 2,000 cars. The accompanying diagram shows the arrangement of the tracks in the new westbound yard, directly north of the eastbound yard, which has recently been completed and put in operation.

The new yard now has about 11 miles of tracks, but, being built on a skeleton plan, there are vacant spaces for additional tracks, which can readily be added to increase its capacity should it become necessary. The system on which the new yard is planned and operated is quite simple; the cars pass through the yard in the direction of traffic or to the westward. Referring to the diagram, it will be seen that a receiving yard, known as the "X" yard, is located at the east end, where the cars are sorted into trains over a system of poling tracks into the departure or "Z" yard. Track scales are provided for weighing such cars as require weighing before they enter the departure yard. There is also an intermediate yard for cars held for orders, known as the "Y" yard, and also a small "bad order" yard for repairing cars; the way car yard is also located directly at the rear of the departure yard.

The receiving yard as built has available room for 280 cars, not counting leads and running tracks, and has seven spaces for tracks to be added from time to time, which will nearly double its capacity. The departure yard has at present 16 tracks with an available capacity of 494 cars, not including leads and ladder tracks; there are also spaces for eight additional tracks, which will increase its capacity about one-third. The "hold for order" yard has a capacity of 84 cars, not including leads and ladders, and has spaces for 11 more tracks, which would increase its capacity about four times. The "bad order" yard has an available capacity for 45 cars, which is considered ample for all needs. In addition to the possibilities for expansion, as indicated, it is possible to add still another yard or system of tracks as large again. It is the intention ultimately to build a round house in the northwest corner of the Chicago, Burlington & Quincy property, near Clyde station, with a loop track around it, making it possible to supply engines with coal, sand and water, and clean the ash pans, without sending the engines to the round house to be turned.

The tracks in the new yard are ballasted with gravel and cinders, about 2 ft. above the level of the surrounding prairie, and a system of sewerage with conveniently located catch basins is provided to keep the tracks absolutely dry. The arrangement of the sewer system is shown by the engraving.



The New Hawthorne Yard of the Chicago, Burlington & Quincy.

Note.—In order to get the yard into our page it has been cut in two. The right hand end of the upper part joins on to the left-hand of the lower part. Center lines only are shown. Sewers are shown by broken lines.

Criticism of English Railroad Signaling.

By Charles Hansel, C. E.

In considering the subject of collisions on English railroads, a discussion of which appeared in the Railroad Gazette of October 7, one is reminded that accidents due to improperly designed signals or signal apparatus occur in England with considerable frequency; and it is believed that an analysis of some of the official inspectors' reports that have been issued during the last year will be of interest.

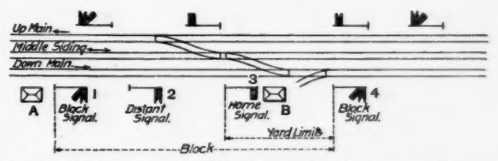
At Globe Road Station, on the Great Eastern, December 18, 1897, a passenger train to Norwich was run into at the rear by a passenger train to Chelmsford. The line is worked on the electric lock and block system. The company's regulations say: Sykes' System—A signalman cannot lower his starting signal until that signal has been electrically released by the signalman at the signal box in advance, who cannot so release the signal until the preceding train has passed over a rail contact in advance of his own starting signal.

It will be noted that with the method of block signaling employed it is only necessary for the first pair of wheels of the train to pass over the contact device and release the unlocking mechanism in the rear, regardless of the fact that a portion of a train may still be in the section, which should be cleared of obstruction beyond peradventure of doubt before the release is effected. This could be accomplished by the introduction of two lengths of rail in a track circuit. With this insulated section installed it would require the entire train, which was intact, to pass beyond a given point, i. e., the end of the insulated section, before the releasing mechanism would be in a position for unlocking the signals for a second train. The regulations also say: Should the home or starting signal be lowered and the distant signal remain at danger the fog signalman must continue to exhibit his red "hand signal," and if the fog is so dense that the engine driver cannot see the distant signal the fog signalman must verbally caution him by using the words "home signal off, distant on," or "starting signal off, distant on," as the case may be.

If the fog is so dense that the engineman is unable to see the distant signal, how is it possible for the fog signalman to see the home or starting signals so that he may advise the driver of their position? The fog signalman is stationed some distance beyond the distant signal, and it would be as impossible for him to know the position of these signals as it would be for the driver.

The inspector's report says: "In accordance with the regulations, the train should have been brought to a stand at Devonshire Street home signal before it was admitted as far as the starting signal, the latter being at danger. Driver Peachey claims that he was justified in assuming the starting signal to be 'off,' as he was not stopped at the home signal, and he doubtless would have gone forward much more cautiously had he received the warning, which under the rules he ought to have had." It is not good practice to have a rule that tends to educate an engineman to assume what position a signal may be in. If it is unsafe to allow a second train to enter a block while the first train is between the home and advance signals the system should be arranged so that the second train cannot enter the block except by passing the advance signal at danger or with the signal proposed in my letter (Railroad Gazette, Dec. 23,) and the card.

At Houghton, on the London & Northwestern, December 23, 1897, an accident occurred on account of the signalman advising the signalman in the rear that the main line was clear between his home and advance signals, when in fact it was blocked by several cars, and he unlocked and accepted a second train while the track between his home and advance signals was blocked. With a properly designed block system it would not have been possible for this accident to occur, as with the arrangement of the short track circuit, before mentioned, a signalman could not have unlocked and accepted a second train while a portion of any train was on the main line or fouling it within the limits of the home signal and a predetermined point beyond it, which in this case under the rules would have been 1,320 ft.



Proposed Arrangement of Two-Arm Signals for Conditional Blocking.

At Dunbar, on the North British, January 3, 1898 (reported in the Railroad Gazette, October 7), there was a disastrous collision at a crossing. This case affords another example of the danger of educating an engineman to believe that he will find no obstruction for a distance of 1,320 ft. beyond the next home signal so long as he had not been stopped and notified of same by the signalman at the cabin in the rear.

Under English practice this sustains the argument that we should not leave it optional with the signalman in the rear to clear his advance while a train is occupying the main track or fouling it be-

(*Continued on page 934.*)

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY.
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Mr. Collingwood, writing in another column, suggests a capital chance for some one, powerful in the councils of the Government of the city of New York, to do a fine thing for the glory of the city and for the good of the engineering profession. The New York and Brooklyn Bridge is one of the noble monuments of that city. It is one of the most striking and beautiful objects which the stranger sees as he sails up the harbor, by day or by night. It is moreover one of the great triumphs of the engineer's art and one of the wonders of the world. And yet no history of this work has ever been written. That could still be done. Most of the men concerned in building it are alive and active and could be enlisted in preparing the political, financial, engineering and traffic history of the bridge. In a few years it will be much more difficult to collect the material for such a history. A few years ago an admirable account was compiled of the work of the Aqueduct Commissioners from 1887 to 1895, and that volume is familiar to city engineers and city officers all over the civilized world. Perhaps some public spirited man will do a like service for his city by providing for an adequate history of the Brooklyn Bridge.

During the past year all the contracting locomotive shops in the United States (that is, those outside of the railroad shops) built 1,875 locomotives, against 1,251 in 1897, an increase of 624, or nearly 50 per cent. In fact, the increase comes within 71 of representing the total output in 1894, and is greater by 218 than the increase of 1895 over 1894, which increase was the largest since 1887. Of the 1,875 locomotives built in 1898, 373, or 20 per cent., were compounds, which is 230 more than in 1897, when the output of compound locomotives represented but 11 per cent. of the total output. The total also includes 12 electric and three compressed air locomotives. The building of locomotives for export continues to steadily grow; but while the number is greater by 168 than last year, the percentage of the entire output decreased one per cent. In 1896, 309 were sent abroad; in 1897, 386, and in 1898, 554; that is, in 1898, 30 per cent. of the total was ordered for export; in 1897, 31 per cent., and in 1896, 26 per cent. In our issue of Jan. 6, 1888, we published statistics giving the yearly output of locomotive builders from 1880 to 1887, inclusive. The following table shows the number built each year since that time:

1898	1,875	1892	2,012
1897	1,251	1891	2,165
1896	1,175	1890	2,240
1895	1,101	1889	1,860
1894	695	1888	2,180
1893	2,011		

The year just closing has been a notable one for the locomotive building industry in two respects: In the size of engines built and the size of single orders. In size of engines, we refer particularly to the 115-ton engines built by the Pittsburgh Locomotive & Car Works for the Union Railroad, and the one weighing 118 tons, built for the Lehigh Valley by the Baldwin Locomotive Works. Among the large individual orders were the following: Great Northern, 30; Missouri Pacific, 25; Illinois Central, 25; Atchison, Topeka & Santa Fe, and Santa Fe Pacific, 50; Baltimore & Ohio, 50; New York Central & Hudson River, 30; Lake Shore & Michigan Southern, 45; Southern Pacific, 51, and Philadelphia & Reading, 30. The five last orders were placed during December, and will serve to keep several builders busy for at least a part of January. Of course, a number of roads ordered engines in two or more lots, the totals of which aggregated over 25, and nearly all the roads we have named bought more than the numbers here stated, but at different times.

In the year just closing the contracting car building companies did the greatest business that they have done since 1890. The total number of freight cars built during this last calendar year was 99,809, the passenger cars were 699 and the street railroad cars 4,650, or a total of 105,158. In 1890, the best year so far as our records show, the output was 103,000 freight cars, but in 1891 and 1892 nearly 100,000 were built each year. The increase of 1898 over 1897 is quite wonderful. In that year our reports from 30 contracting companies (and five estimated) showed 43,588 freight cars. This year our reports are from 28 companies and from 26 others we have made estimates carefully checked. These are mostly very small concerns. In 1896 the freight cars built outside of the railroad shops amounted to 51,189, in 1895 to 38,100 and in 1894 they aggregated only about 18,000. Among the cars reported this year we find 1,723 built for export; of these, 97 were street cars. In making this summing up of car building last year we found 2,107 street railroad cars reported to have been built. We said at this time that this was certainly much below the number actually built, as our reports were from few concerns outside of those which built steam railroad cars as the most important part of their work. This year we have been able to get more reports from the companies devoting themselves especially to street car work and find a total of 4,650. These figures for the two years should not be compared. In writing a year ago we said: "We judge from the estimate of probable equipment requirements printed elsewhere that the year 1898 will be a much better one for the car builders than the year just passed." This prediction has been carried out far beyond our expectations.

Torrey E. Wardner, editor of the Boston Traveler, has been imprisoned for thirty days for contempt of court in publishing criticisms of Judge Sherman, the judge who tried the case of Engineman Getchell, the man responsible for the fatal rear collision at Sharon, Mass., last August. Judge Sherman sentenced Getchell to two years' imprisonment, stating at the time that that was as lenient a sentence as could be given under the law. The criticism of the Traveler (or, one criticism—we do not know that we have seen all that has been published) averred that the judge (formerly prosecuting attorney), cross-examined Getchell in such a way as to prejudice the jury against him; and that Judge Sherman was so addicted to behavior of this kind that he was unfit to sit on the bench. At various times since the collision we have seen in the Traveler editorial notes which seemed to be made up largely of ignorance and malice; the railroad company has been harshly criticised; and in this last utterance it is intimated that Getchell has been made a scapegoat to be punished in place of the company. It seems to us that the engineman's conviction is just. We do not know but the length of the imprisonment is excessive; that is a question which judges settle by legal precedent; but as to culpability, we think there can be no doubt. The most significant testimony at the trial was that Getchell "had frittered away the air pressure" that he needed to control the brakes. This was not successfully controverted. In running a passenger train at speed without knowing that his brake power was adequate, Getchell took the risk of the punishment prescribed by Massachusetts law for gross neglect, which certainly is a fair characterization of his conduct. But the case was plainer than that. The judge and jury may not have comprehended the intricacies of the air brake, and if they had they might have been lenient concerning that feature; Getchell, however, disobeyed a plain rule requiring him to reduce speed to six miles an hour at the automatic signal at the entrance of the Sharon block. This signal was several thousand feet back of the point of collision, and the rule requiring the reduction of speed, without regard to whether a preceding train was or was not visible, gave the engineman a chance to save himself in spite of his lack of air-brake power; he had time to signal for hand brakes. This signal he did not give (or not until long after it was too late to be of use), and so both judge and jury, however deficient their technical knowledge, were forced to decide that there had been gross negligence.

Railroad men will note, however, that although the six-miles-an-hour rule, if obeyed, would have saved Getchell at Sharon, it would not insure safety in all cases. If the preceding train had stopped only a short distance beyond the entrance to the block section, instead of nearly at the farther end of it, a following train with inadequate brake power would have been in a fix. The foremost train—or any train—has a right to stop anywhere; and to expect that the automatic signals will warn following trains at a sufficient distance in the rear. But "sufficient" means sufficient to give room to "pull up" by the aid of brakes promptly applied. To call by whistle for hand brakes cannot be regarded as insuring a prompt application in these days. If, as we understand, there was no distant signal in this case, the rail circuits are probably "overlapped" so that there shall be a minimum distance of 1,500 feet or 2,000 feet between the rear of a passenger train and the stop signal next behind it. This is the distance in which an engineman must be prepared to stop; and one who does not know his air-brake as thoroughly as he knows how to manage the fire and the water, must beware.

Events of the Year in the Traffic Field.

The year 1898 has been a busy one for traffic managers, and they have had more varied experiences than usually fall to them within a single twelve-month; and yet the verdict will probably be that the events of the year have been commonplace. Some interesting things have been done, the like of which had not been done before, yet every change has seemed to be the result of a natural and easy evolution.

The very low prices at which an enormous quantity of grain has been carried from the far West to the seaboard constitute one of the most important features of the year's history, and the decision of the Supreme Court in the Joint Traffic Association case will be long remembered in connection with this era of low rates, though the decision was not the cause of the reductions. These were due, so far as they were due to any action of the courts, to a decision of last year, which the Joint Traffic decision simply confirms.

Just how low grain has been carried has not been made public, as each road making low rates has concealed them, for the ostensible purpose of deceiving competitors (which purpose has uniformly failed) and for the more practical purpose of evading the terrors of the law. All secret interstate rates are violations of the spirit of the Federal law, and many of them are violations of its letter also. But there is little doubt that hundreds of carloads have been carried at about 1½ mills per ton per mile. The underlying reason impelling the railroads to give the public these astonishing low rates is the great reduction in the cost of transportation which has been effected during the past few years, and the multiplication of routes and facilities. Although the export movement has been very heavy for two years, the facilities have also been multiplied, and so prices have not only been kept down, but have been reduced. Railroads from the grain fields now carry cheaply to Montreal, Newport News, New Orleans and Galveston, as well as to the older grain ports, and the facilities of these roads are not merely of a character to be available in a year of heavy crops; they are ample for a heavy movement at any time and on short notice. All the railroads, new and old, have large cars and powerful engines, with rails and bridges strong enough to match them, and so can carry at very low rates for any length of time. In spite of the enormous demand for grain in Europe the limit of railroad facilities has not been reached and so competition continues severe. On shipments from Kansas and Nebraska it looks as though the railroads to the Gulf of Mexico had the upper hand; at any rate we do not hear of any such extremely low rates per mile by the Gulf routes.

Competition in dealing with large shippers (but not with those who send only small lots and who are innocent enough and honest enough to go by the published tariff) has been growing more and more intense for two years. As soon as the Supreme Court decided (in the Trans-Missouri case in March, 1897) that the Anti-Trust law applied to railroad rate agreements, everybody saw that such agree-

ments were even less likely to serve a useful purpose than they had been before, and so the rate-cutting roads took more liberties than ever; and as time went on and no one was called to account by the officers of the law, others joined in the scramble and practically all of the roads carrying grain and provisions in large quantities became unlawful rate-cutters. At any rate, no road went without business in this department and no large shipper could afford to pay regular rates. It was, and is now, well understood that a shipper paying regular published rates for transportation could not sell his grain in the East for what it costs him.

No one can tell what portion of the important additional earnings enjoyed by the roads this year has come from the grain and provisions which have been the subject of this notorious rate-cutting, for on every road these commodities make up only a moderate percentage of the total traffic; and as for discovering the benefit that has accrued to the net earnings of the roads, not even the officers of the roads themselves can make a very close estimate, for at the low rates which the shippers say they are paying, this freight can hardly bear its share of the fixed charges. Some of it probably has not paid anything toward fixed charges, and so may have been carried at a loss.

Some months ago the president of two important grain carrying roads told a newspaper reporter that railroad presidents, in the stress of competition, became lawbreakers—that is, knowingly assented to the payment of rebates which the law forbids. Later the same president admitted that certain large coal shipments had been carried over his own road in violation of the law: that is, had been carried for less than the published tariff rates. Within the past week the receivers of the Baltimore & Ohio, in a letter to the Interstate Commerce Commission, have virtually confessed that rates are secretly cut on that road (for that is the only interpretation that can be put on their statement that tariffs will be adhered to from a certain future date). These confessions may or may not lead to a general abandonment of unlawful practices; at present they are significant chiefly as indicating that railroad men's consciences are not all dead.

As already said, the decision of the Supreme Court made no difference in the law. It is equally true that no other judicial decision of the present year has made material changes in statute law; but there have been a number of decisions on significant cases which will tend to strengthen the law in certain directions. Perhaps the most important of these is that which has just been rendered in Texas by United States Judge McCormick. This decision only reaffirms principles laid down by Justice Brewer, of the United States Supreme Court, in a former Texas rate case. The decision of the United States Supreme Court in the Nebraska rate case, earlier in the year (March), was in the same direction. These and other decisions warning state officers not to prescribe unreasonably low rates for the transportation of persons or property by railroad still leave much to be desired, because in each case thus far tried the rates passed upon have been at such decided variance from a reasonable standard that the court was not called upon to make fine distinctions. It could settle the case in hand without entering upon the discussion of numerous subtle points governing the adjustment of the relative rights of the public and of the carrier in making transportation rates.

The opinion of Commissioner Prouty in the Canadian Pacific passenger-rate war deserves mention as one of the notable judicial utterances of the year, because of its strong character and its success. The reasoning of this decision was so forcible and clear that it compelled assent. The refusal of the Interstate Commerce Commission to disturb the differentials on grain from the West to New York, Philadelphia and Baltimore also deserves mention. The imposition of penalties, aggregating many thousand dollars, against the railroads of Texas for unlawful rate-cutting, has been a notable item of traffic news.

Aside from the cases already mentioned, rate wars have prevailed in freight traffic between North Atlantic ports and Texas (nearly all of which goes by water), and in passenger rates between Chicago and St. Paul. Possibly it is not fair to dignify the latter by the name of war, but irregularities have been reported with such frequency as to give that impression at this distance.

The minor news of the year, in the freight department, has included (1) systematizing the rates for storage of freight on most of the large roads, following the investigation which was made by the Interstate Commerce Commission at New York; (2) an attempt, in the Southwest, to use a tariff based on cubic feet for the transportation of bulky freight; (3) an important consolidation of agencies by the Vanderbilt fast freight lines. The Wabash has established a line to Buffalo by leasing trackage from the Grand Trunk, and the Canada Atlantic has established a lake and rail freight line from Chicago to Montreal.

In the passenger department the principal topic has been the war on the ticket scalper. The law of New York, designed to practically suppress ticket brokerage, which was passed in 1897, has been declared void, but it is not certain that this will be a serious setback. In the first place not much progress had been made under the law, and in the second place it is possible that Congress will proceed the same as though nothing had happened in New York. Mr. Daniels and the other passenger men who have been actively promoting anti-scalping laws, seem at last to have secured a degree of co-operation by the mercantile community which will materially help their movement. A number of cities have made attempts, mostly of a temporary nature, to so regulate ticket brokerage as to prevent swindling.

The Chicago & Alton, the Chicago & West Michigan, and the Missouri, Kansas & Texas, have abandoned their successful scheme for securing the better collection of fares on passenger trains. After having used for five years the gates, by which an attendant was enabled to inspect the ticket of each passenger boarding a train, the gatemen have been taken off. The increase in income which was secured by making passengers buy tickets (and making them show them), seems to have been highly satisfactory, but to thus inconvenience the public was a delicate undertaking, and one road, at least, seems to have concluded that the task is so difficult that it is not worth continuing; and when one road gave up its competitors had to follow.

The transportation of large numbers of United States soldiers during the war with Spain has led to severe competition and probably, on some roads, to the lowest rates which have been made for many years. The general passenger agents have made progress in the adoption of safety paper for interline tickets, and the success of the interchangeable mileage ticket in Central territory has been further confirmed.

All railroad men, and practically all conservative business men, are now convinced that the interests of farmers, merchants and carriers all demand the repeal of the anti-trust law, so far as it affects railroad transportation; and they are nearly as well agreed that pooling of railroad earnings ought to be legalized, but it is impossible to estimate what prospect there is of action by Congress. The Cullom bill, introduced last January, affords good groundwork for discussion of the railroad problem, but no one feels sure that it will be taken up before March 4, when the present Congress expires. The National Board of Trade has just offered to Congress another bill which is much simpler than Mr. Cullom's, and which seems to have some influential support. Congress is supposed by most people to be so engrossed with subjects growing out of the Spanish war that it will spend very little time on other matters; yet the House took up the Anti-scalping bill the other day and passed it in short order.

The National Board of Trade.

Another bill to authorize traffic pools is now before Congress, or soon will be, a committee of the National Board of Trade having drawn up one at the recent convention of that body in Washington. It is much simpler than the Cullom bill, presented a year ago; and, like that, it is said to have had the benefit of the counsel of one or more of the Interstate Commerce Commissioners in its construction. Whether or not this indicates that the Commission and the business interests of the country have come to an agreement on this subject remains to be seen. It is said that the committee who drafted the present bill will have the co-operation of influential railroad men in presenting its merits to Congressmen.

The two meetings of commercial men which were held in Washington did not reach exactly the same conclusions on all of the transportation subjects which were discussed, though the transportation interests were represented in both conventions largely by the same set of men, the Freight Commissioners. The Freight Commissioners, at their own convention, which was the first held, resolved that, as railroad men in the employ of shippers, it was their duty to keep up the most friendly relations possible between shippers and carriers; and they pledged themselves to aid the railroads in preventing legislation "needlessly injurious" to common carriers, as well as to favor legislation beneficial to railroads, provided it should afford the public "all needed protection." They also resolved in favor of uniformity of freight classifications as far as practicable, recognizing, however, that local conditions are in many cases such that a rigid, uniform classification, adopted by law, would be injurious both to the public and to the railroads. A third resolution set forth that, as nearly all transportation is practically interstate, the fewer state laws passed on the subject of transportation the better will it be for all interests.

The National Board of Trade, the organization which held the second convention, adopted a report received from its Committee on Transportation, recommending numerous amendments to the Interstate Commerce Law, including the old uniform classification clause. This, it will be seen, overrides the moderate and reasonable resolution of the Freight Commissioners. On the subject of pooling, however, the action of the second convention was not materially at variance with that of the first, though it is hardly worth while to split hairs over the opinion of either body, for the pledge of the Freight Commissioners, with its clause about the "protection" of the public, is sufficiently vague in its terms to secure the vote even of a pronounced opponent of pooling.

The Committee of the National Board of Trade, which prepared the bill to be laid before Congress, consisted of Messrs. F. B. Thurber, of New York; A. J. Vanlandingham, of St. Louis, and E. P. Wilson, of Cincinnati. The bill provides (1) that the findings of the Interstate Commerce Commission shall be rigidly enforced, unless upon special appeal they are found to be unjust and unlawful; (2) that all rates shall be made public; (3) that the penalty for violation of the Interstate Commerce law shall be a fine, to be paid by the transportation company, instead of imprisonment for the agent as at present; (4) that carriers may make agreements for the establishment and maintenance of fair, uniform and lawfully published rates, and may protect such agreements either by distribution of earnings or otherwise, rates in such cases to be subject to the approval of the Interstate Commerce Commission. It is said that the members of the Committee are very anxious that the word "pooling" shall not be connected with their measure. These three gentlemen are members of a standing committee on the Interstate Commerce Law, which is directed to confer with members of Congress. The convention also adopted a resolution asking Congress to pass a law regulating express companies.

Receivers Cowen and Murray of the Baltimore & Ohio have published a letter promising to maintain rates, and the substance of it will be found in our traffic column. A Washington reporter says that in connection with this letter, or before, the Receivers admitted the truth of the charges of secret cutting of rates over the B. & O., which were presented to the Commission a few weeks ago by the Chairman of the Southwestern Freight Bureau. The same reporter says:

"It is not proposed even now that the Baltimore & Ohio shall play the spy or the police agent in bringing rival companies to the bar of judgment, but simply that it shall report to the Commission any signs which it observes and which seem to it particularly suspicious; the work of investigation and the setting in motion of the machinery for the punishment of guilty parties will remain with the Commission alone. The Commission has of late shown itself unexpectedly resourceful in getting at the facts in several troublesome cases which it investigated, not so much with a view to punishing lawbreakers as to making certain significant conditions public and thus paving the way for reforms."

"Signs which seem particularly suspicious" may be very numerous, while legal evidence may be hard to get, but we shall be glad to see the Commission's arms strongly supported by the law abiding railroads, and we trust that the resourcefulness of that body will continue to grow. It will be a great gain to have rate cutting brought out into the daylight.

In a preceding article we have noted the action of commercial men at Washington on the subject of a uniform freight classification for the entire country. While the formal voting seems to have been of the usual perfunctory kind that this subject has been afflicted with for the past ten years, we are glad to see that one of the merchants' representatives, Freight Commissioner Vanlandingham, of St. Louis, has intelligent views on the subject. A Cincinnati paper reports him as saying: "This matter of classification should be left in the hands of the railroads, and they should be called upon to fix the rates as their best knowledge and experience dictates. Just so soon as Congress attempts to adjust a uniform rate just so soon will men who cannot be competent be called upon to pass on matters with which they cannot be conversant and the public will not in any sense be the gainer. As an illustration take the 1895 trouble in Chicago over alleged freight rate discrimination against that city in favor of Cincinnati, Indianapolis, Toledo and other eastern points. An investigation disclosed that the lower eastern rate had been fixed by the railroads in their own interest, while the rates paid by Chicago merchants were fixed by state legislation. Discrimination should not exist, but absolute uniformity in itself would be one form of discrimination."

NEW PUBLICATIONS.

Thermodynamics of the Steam Engine and Other Heat Engines. By Cecil H. Peabody, Professor of Marine Engineering and Naval Architecture, Massachusetts Institute of Technology. Fourth edition. New York: John Wiley & Sons; pages 522, 6x9 in., illustrated. Price $5.00.

Professor Peabody's work on Thermodynamics is well known among engineers, its clear and strong presentation of an abstruse subject having aided many to a knowledge of heat and its effects. It might be sufficient for most readers if the simple announcement was made that this, the fourth edition, has been rewritten and reset with the addition of much new matter. There may be some, however, who desire to know more of the scope of the book.

In the revision, two aims are evident—simplicity of statement and extension of treatment. Had the author followed the Rankinean analysis, which is in keeping with modern methods of treating analytical mechanics, he would perhaps have been tempted to add to rather than eliminate a part of the mathematics. This leads to the question, can thermodynamic principles be clearly understood without the rigid mathematical analysis? We must leave it to those whose opinion in the matter would carry weight, but at the same time express a preference for the mathematics.

It should be said, however, this book is typical in its treatment. The author has followed the methods of Clausius in his discussion of the subject, and it is well that we have such an excellent American text book on Thermodynamics that gives in so direct a way the essence of the treatment of one of the founders of the science.

The additions to the book make it of even more value than formerly to the practical man. Attention is called to one addition as a fair illustration. More than 25 pages has been added to the chapter on hot air and gas engines. Included in this is a discussion of the Diesel motor. Prof. Peabody gives an analysis of the cycle for the engine from the indicator diagram, and concludes by presenting the best work that has been done thus far from trials. From this we learn that the motor has run on about ¾ lb. of coal per English horse power.

Railway Economics. By H. T. Newcomb, LL. M., Chief of the Section of Freight Rates, United States Department of Agriculture, etc. Philadelphia: Railway World Publishing Co., 1898.

The author in his preface says that "this little work was intended to present the principal facts which establish the position of railroad transportation in the present organization of industry in the United States." In a volume of only 152 pages he contrives to give much information which will be useful to lawmakers and editors and citizens who wish to know something about the service of the railroads and the relations of railroads to each other, and to the people at large. He collects convenient and useful statistics concerning the capitalization, income and expenditure of railroads, the relative payments for labor and material, the decline in rates and prices, the amount of use of the railroads, etc. He discusses competition, what it is, and where it is, and why. He also takes up the matter of discrimination in general among individuals and among places, and he discusses at some length the subject of pooling and says something of traffic associations. The book ought to have a wide circulation among people outside of the railroads, as it could hardly fail to have a good influence.

The American Lumberman.—The Northwestern Lumberman and the Timberman, both published in Chicago, have been consolidated and the new paper will be called the American Lumberman. Its office is at 315 Dearborn St., Chicago, and Mr. W. B. Judson, now editor of the Northwestern Lumberman, will be Business Manager, and Mr. J. E. Defebaugh, of the Timberman, will be editor.

Criticism of English Railroad Signaling.

(*Continued from page* 931.)

tween signals 3 and 4, or a distance of 1,320 ft. beyond signal 3. If we admit that the consensus of opinion among American operating officials makes it necessary for us to stop a train at the cabin in the rear in order to advise it that the track between 3 and 4 is occupied at that time, we acknowledge that the distant and home signals do not fulfill the functions intended for them; that the home signal is absolutely useless as a block signal for the purpose of closing up trains. It is not controlled by the cooperation of two men and should, therefore, be called the home signal instead of the "home block," as the Standard code has it.

In the Barrassie case (reported in the Railroad Gazette, October 7), it appears that Signalman Norrie cleared the signals for the goods train, and after doing so decided that the passenger train would be able to make the crossing ahead of the goods train. The goods train not being near his distant signal he placed the signals normal and cleared the signals for the passenger train. The driver of the goods train knowing that in accordance with the rules he should not have been allowed to leave Old Troon while the crossing was obstructed, naturally approached it at a high rate of speed, expecting to find the "line clear." Both trains came to the crossing simultaneously and the collision occurred. The entire responsibility for this accident should be on the engineer for not having his train under control so he could stop on seeing the distant and home signals against him. The latter part of this report directs attention to the advantages of unlocking block instruments with the levers operating the points and signals. Had such a system been in use at Barrassie it would have been impossible for the signalman to have moved the facing points of the junction so as to allow the passenger train to cross the path of the goods train after he had accepted the latter; or, vice versa, to accept the goods train after he had set the junction for the passenger until one train or the other had passed the junction, and the collision would, therefore, have been averted. But why take this roundabout method? To unlock the block instruments with signals and points, making it impossible for any reason for the signalman to change routes or block the signals, would complicate matters seriously and delay traffic unnecessarily at times. So long as the goods train overran the signals at danger how could this have prevented the accident?

It must be remembered that if railroad traffic is impeded by fog it is quite feasible to give the engineman an audible signal, as is done by the torpedo machine in connection with the signal. This practice is carried on very successfully on many railroads in the United States, notably in the Fourth Avenue Tunnel on the Harlem Line, between 42d street and 138th street, New York City.

At Tiverton Junction, February 22, 1898, a passenger train from Bristol ran into the rear of a passenger train from London. It appears that the second train had been standing at the down-starting signal at Whitehall Tunnel waiting for "line clear." The signalman had a light engine to dispatch to Wellington; the signal was out of order and the signalman told a plate layer to give a message to the driver of the light engine to start. This man called out "right away," which was passed on by a second man to the driver. This shouting of "right away" was heard not only by the driver of the light engine, for whom it was meant, but also by the driver on the passenger train, who, thinking it was intended for him, started away for Tiverton Junction.

How can any system of "shouting" be called an absolute block signal? It is certainly a very unsafe method of moving trains where there is said to be an absolute block system in service. Had caution cards been used it is not at all likely that this confusion would have occurred, as it would have been necessary for the engineman of the passenger train to obtain the proper caution card from the signalman before he passed the advance signal. In the latter part of the official report we are advised that the signalman was "technically wrong" in permitting the second train to wait at his starting signal. Why is it necessary to have a rule forbidding a train standing at a starting signal waiting for the starting signal to be cleared? It should be protected in the rear by the home and distant signals.

In the collision at St. Johns, on the Southeastern, March 21, 1898 (reported in the Railroad Gazette editorial of October 7), the primary cause was that the signalman forgot that the train from Tonbridge was standing at the up-home signal and unlocked the signalman in the rear for the train from Hastings. A lock and block system should be so installed as to make it impossible for this accident to occur. The signalman's forgetfulness of the situation should not have had any bearing on the case; all failures of the apparatus should be on the side of safety so that the only interruption to the proper working of the machine would be by malicious interference and not through forgetfulness. No train or any portion of a train had passed his home signal and yet it was possible for him to unlock the signalman in the rear and accept a second train while the block was occupied by the first one.

While the official report criticises the system in use at St. Johns, no remedy is offered. The system should be designed and so constructed as to give a visual and an audible indication when the first car of the train passes the home signal, and a visual and an audible indication when the last car of the train passes the home signal, so arranged that it would be impossible to unlock the signals in the rear for a second train until the indication that the last car of the train had passed said home signal. Since such a system can be installed, maintained and operated at the same expense as the inferior one now used at that point there is no excuse for such collisions as this.

At Sheffield, on the Great Central, June 4, 1898, a passenger train from Doncaster came into collision with the rear of the train from Retford which was standing at the down platform. "Absolute block working" is in force between No. 6 and No. 8 cabins, but station yard working has been specially authorized from cabin No. 6 through the station. The company's rule book states that where the traffic at any station is worked under special instructions the signalman before lowering the signals for a train to enter the station must stop the train and caution the engine driver both verbally and by green hand signal held steadily in the hand before he allows it to enter the station. In this case the engineman and fireman maintained that the outer home signal was clear and that they received no verbal information or visual signal from the signalman that the station was blocked; but the signalman claims that he gave the proper instructions. This only proves once more that where the rule requires verbal instructions to be given, an accident is always liable to be explained in different ways by different men, and no one can tell which man is telling the truth. Such a question should be susceptible of determination by fact instead of opinion or "claims," and with suitable signal apparatus it could be.

The Glendon Tie Plate.

Messrs. Dilworth, Porter & Co., of Pittsburgh, have lately brought out a new tie plate known as the Glendon longitudinal flange tie plate, designed for use in soft wood ties. It has the essential points of the general type of longitudinal flange plate, which has been successfully used for the last six or eight years. It will be observed that the side flanges are overlapped by the body of the plate, and it is believed that this will protect the wood from some of the bad effects of water getting in where the fiber is spread by the entrance of the flange. It will be seen further that the rail rests on a bearing surface which is immediately over the flange, and it is claimed that this plate is 30 per cent. stronger than any other tie plate of the same size and weight. The depressions between the bearing surfaces will tend to collect dirt and grit, thus reducing the friction and wear on the plate, and it is claimed that these depressions are so shaped that the grit will be readily displaced by wind. Although the outer flange is overlapped by the body of the plate, yet the top of the plate is so shaped that the bearing surface does not project materially beyond the flange, thus minimizing the rocking. Finally, the makers claim great adhesion and lateral resistance, and also that the flanges are proportioned so as to compress the fiber without crushing it. These plates will be supplied 6 in., 5 in. and 4½ in. wide and from $\frac{1}{16}$ to $\frac{3}{8}$ in. thick and of any strength desired. Special plates will be furnished also for switch leads, frogs, crossings, etc.

TECHNICAL.

Manufacturing and Business.

Newspapers state that the Navy Department is preparing advertisements calling for bids for building a new dry dock for Boston.

Ed. J. Fitzgerald, Lincoln, Neb., is offering for sale a light second-hand locomotive built by H. K. Porter & Co. The engine can handle 45 tons on track.

E. H. Bradbury, Brighton, Tenn., wants a second hand steam shovel. He also wants a second-hand light locomotive that will handle 15 five-yard dump cars on a 26-ft. grade, to take the place of a heavier one.

Safety hollow staybolts have been specified for the locomotives now being built by the Rogers Locomotive Works for the International & Great Northern.

The J. A. Fay & Egan Co. 202 W. Front St., Cincinnati, is offering for sale a lot of second-hand wood working machinery.

The headlights for the Southern Pacific locomotives recently ordered from the Schenectady Locomotive Wks., will be furnished by the Dressel Railway Lamp Works, of 1596 Vanderbilt Ave., New York. We are advised by the lamp works that the Schenectady Locomotive Works have adopted their headlights as standard to be used on all engines built by them where others are not specified.

G. M. Garvey, Memphis, Tenn., is offering for sale 30 second-hand dump cars, built by Kilbourne & Jacobs. They are 3 ft. gage, 11 ft. 2 in. long over all, 6 ft. wide, 20 in. deep. Capacity, 3 cu. yds.; will dump on either side.

Shields & Evans, St. Paul, Minn., are offering for sale a second-hand Little Giant steam shovel on standard gage car.

The Cambria Mining Co., Cambria, Wyo., wants from 200 to 800 ft. of well casing 9⅝ in. and 10⅝ in. inside diameter. The company is also looking for a steam shovel with a capacity of 2,500 cu. yds. in 10 hours.

J. W. Duntley, President of the Chicago Pneumatic Tool Co., writes from London to the effect that the growth of the company's business in England is more than satisfactory. Mr. Duntley is about to make a trip through France, Belgium and Germany. He

states that the machines made by the company are meeting with great success in those countries.

The Iron Age states that it has confirmed, on authority usually well informed, that the Carnegie Steel Co. will build a plant for making steel cars. The capacity of the plant is to be 40 cars a day. The article goes on to say that the enterprise is not antagonistic to the Schoen Pressed Steel Co., but that the two companies will work in harmony. It is believed that no one concern can meet the coming demand for steel cars.

Iron and Steel.

W. T. Graham has resigned as President of the Aetna-Standard Iron and Steel Co. He has been appointed First Vice-President of the American Tin Plate Co.

The Pittsburgh Bridge Co. has received an order from the Mexican Central for erecting 700 tons of structural material.

New Stations and Shops.

The Mexican Central has commenced grading for its new shops at Aguas Calientes, which have been previously mentioned in this column.

Simplon Tunnel.

Work on the Simplon Tunnel is making satisfactory progress at the Swiss end, though the rock is loose slate and full of water and dynamite cannot yet be used. About the middle of November the tunnel had penetrated 556 ft., and it was expected soon to reach the solid rock. At the Italian end, however, work was much delayed and only 98 ft. of tunnel had been excavated, and the government authorities are said to have placed many obstacles in the way, collecting a high duty on dynamite and then hesitating to authorize the use of that explosive.

The Nicaragua Canal.

Another Nicaragua Canal bill has been introduced into the House of Representatives, this time by Mr. Corliss, of Michigan. This bill provides that the United States shall buy from Nicauragua a strip of land 15 miles wide on either side of the canal, which Mr. L. E. Cooley thinks can be done for about $3,000,000. Bonds are to be issued for building the canal, which shall be carried out under a commission made up of lawyers, business men and engineers. It is said that this bill embodies the ideas of Mr. Cooley, and that the syndicate which he represents will be willing to take the contract to build the canal on a percentage basis.

English and American Machine Tools.

The Engineer, of London, in a recent issue has something to say about automatic machine tools, taking as a text the tools exhibited at the recent cycle show. The statement is made that "the English manufacturer is at length beginning to recognize that automatic machine tools are of great importance. There can be no question that the automatic tools and automatic devices applied to machine tools have come as a permanency. The automatic tool has arrived at such a state of perfection that no longer need any hesitation be felt in adopting it. American engineers do not stand still, and they have eagerly learned by experience. The consequence is that their tools are as stoutly built as our own, and are as well finished; and in accessibility of their working parts, in ingenious automatic devices, in adaptation for rapid work, in convenience and handiness, they are far ahead of the productions of most British firms. There is but one other point to which we must in conclusion call attention, because it struck us forcibly at the show; that is the continual improvement in the American tools and the appearance of new designs. It shows how keenly alive the Americans are to everything which may give them the advantage, and how strong the rivalry between the different makers continues to be, and it is one of the points that the English maker less ready in invention will have the greatest difficulty in combating."

THE SCRAP HEAP.

Notes.

The Populist Kansas Legislature has begun its two weeks session, and a bill has been drafted reducing freight rates 20 per cent. A reduction of 25 per cent. is proposed in express companies' charges and one of 40 per cent. in the rates for telegrams.

Marine underwriters in Chicago estimate that the losses on the Lakes during the past season have amounted to $2,600,000, a much larger sum than during any other recent season. The number of vessels destroyed was 58, with an aggregate tonnage of 29,191.

Chicago papers report that for one week, beginning Jan. 1, the Chicago, Burlington & Quincy and the Chicago & Northwestern will both run very fast mail trains from Chicago to Council Bluffs, with a view to showing the Post Office Department which road can perform the best service.

There is some agitation in Montana looking to the passage of a law creating a state railroad commission. The two principal railroads in the state have lately reduced their local passenger fares, but this action seems to have only whetted the appetites of the people for low rates, and now there is talk of asking for a further reduction.

The Missouri Pacific has raised the pay of passenger conductors who run more than 4,000 miles a month. The rate is made 2½ cents a mile, but with a minimum monthly rate of $100 and a maximum of $125. Heretofore the maximum has been $100. The Southern Railway has made an increase of about 10 per cent. in the wages of shopmen.

The new steamer Cape Charles, belonging to the New York, Philadelphia & Norfolk Railroad, was destroyed by fire on the night of Dec. 16 at Pinner's Point, Norfolk, Va. The loss is estimated at $100,000.

On the night of Dec. 20 a passenger train of the Illinois Central was stopped by robbers near Pope Station, Miss., but after making a mild attempt to break open the express car they gave up and ran away.

A press despatch from Fargo, N. D., says that the United States Court has decided the long-pending suit of the railroads for an injunction against the enforcement of the freight rates prescribed by the railroad commissioners of that state last year. The decision is in favor of the railroads, the state failing to show that the rates hitherto prevailing will yield more than a fair income on the capital of the railroad companies.

General Superintendent W. F. Potter, of the Long Island Road, has just delivered prizes to six station agents for the past year. Stations are divided into three classes, and in each class there is a first prize of $35 and a second of $15. The first prizes went to Far Rockaway, Quogue and Morris Park, and the second prizes to Babylon, Southold and Medford. An annual inspection is made of the outward condition and appearance of the stations, and besides this the committee awarding the prizes takes account of the manner in which the business of the station is conducted. The officers of the road find that the inspection tour affords a valuable instrumentality for intercourse between themselves and the agents.

General Manager Hays, of the Grand Trunk, after several weeks' negotiation, has offered to refer to three arbitrators the demands of the telegraph operators of the road for increased pay and decreased hours; and it is said that Mr. Powell, the chief representative of the operators, has agreed to the proposal. The officers of the brotherhood refusing to show their authority to act for the operators, Mr. Hays, two or three weeks ago, sent a letter to all operators asking them to say whether they had authorized the brotherhood officers to represent them. The result of this circular has not been given out, but the offer of the company to arbitrate would seem to indicate that a majority of the operators acknowledge the authority of the brotherhood.

The 50-Year Street Railroad Ordinance.

The town board of Cicero passed 50-year ordinances on Dec. 20 for the six street railroads. But on account of the hour at which the board acted, 2 a. m., and other suspicious circumstances, the Grand Jury, then in session at Chicago, took up the matter and is conducting an examination regarding it. Although the franchise granted to the Cicero & Proviso stipulates that a five-cent fare from Austin to Chicago shall be charged, that road only sells tickets at this rate by the dollar's worth. The whole matter is further complicated by the fact that on Tuesday, Dec. 20, the various villages forming the town of Cicero expressed by a vote their desire to separate from it, and to form separate communities in the Western Suburbs of Chicago.

Proposed Railroad Exhibit at Paris Exposition.

About 30 railroads were represented at a meeting held in Chicago last week to consider a joint exhibit at the Paris Exposition. Mr. Charles B. Maugham, of Chicago, suggested a plan for a large scenic map showing the route of every railroad in the United States, and also showing in proper proportion and color the elevations and natural features of the country. A committee was appointed to act with Mr. Maugham to interest other roads in the project, and in securing the money necessary to make the exhibit, for which it is hoped $100,000 will be raised.

Fifth Avenue (New York) Stage Line Sold.

It was announced last week that Messrs. Henry Hart, Albert J. Ellis and Edward Lauterbach had bought the Fifth Avenue Stage Line of New York, and in the purchase had acquired the franchise under which stages are run from the Bleecker street station of the Sixth Avenue Elevated up Fifth avenue to Eighty-ninth street. Mr. Hart and associates have purchased the line as individuals, but all are prominent in the affairs of the Third Avenue Railroad, which may some day secure actual control of the Fifth avenue line. For the present the road will be run as formerly, but plans are being made to introduce automobiles to be driven either by electricity, gas, or compressed air, the motive power not having as yet been selected. At present, however, it is impossible to state when the change will be made. The capital stock of the stage line is $50,000.

A Swedish Passenger Tariff.

A Swedish Government commission has reported a scheme for a new passenger tariff. For distances of 100 kilometers (62 miles) or less, it proposes rates slightly less than half the present round-trip fares. For fast trains, however, the lowest fares for any distance within this limit are to be 1.50, 2.50 and 3 crowns (40½, 67½ and 81 cents, respectively). Beyond 100 kilometers the fares are per zone, and there are to be 12 zones of 15 kilometers each, up to 280 kilometers; 11 of 20 kilometers up to 500, 6 of 25 up to 650, 3 of 30 up to 740, 4 of 40 up to 900 (559 miles); beyond which a zone is 80 kilometers. For the first 100 kilometers the fares proposed are 2.25, 3.75 and 6 oere per kilometer, against the old rates of 4, 6 and 8 oere for the three classes. An oere is 0.27 cents, so that the new rates are 0.977, 1.629 and 2.61 cents per mile. The rates per zone are not given in the account of the report before us. A fixed charge of 13½ cents for all distances is recommended for bicycles.

The Brocken Railroad.

The Brocken, dear to tourists and to readers of Goethe's "Faust," has been made accessible by a mountain railroad, opened last November. It is 10 miles long, of meter gage, an adhesion road, ascending in broad curves to the peak, 3,914 ft. above the sea. The cars are on trucks, with seats for 48 and standing room for 12. The locomotives are four-cylinder engines, weighing 71,500 lbs. The views from the line are among the finest in Germany.

The Majesty of the Law.

On a route between Berlin and Zurich, 607 miles long, a buffet car runs through, and it was intended that its occupants should be able to get refreshments anywhere on the route. But the managers had not reckoned with the canton of Aargan, between Basel and Zurich, across which for 39 miles, the train runs. The canton had no objection to the car, but levied a tax of 1,000 francs per year on the lessee. Wherefore the latter has his car kitchen sealed up during the passage through Aargan, and the canton gets no tax, and the passengers satisfy their hunger and thirst before or after such passage.

The Power Plant at Denver.

The work proposed by the Power & Irrigation Co., of Denver, has been begun by building the reservoir on the Platte River, to cost about $1,000,000. The total cost of the plant is estimated at $3,000,000, which is the capital stock of the company. Mr. James E. Rhodes, of Denver, is President. The transmission line will be 23 miles long, and will probably have an output of 20,000 h. p., with ten generators of 1,500 k.w. each, and transformers to correspond. (See Railroad Gazette, Nov. 18, p. 835.)

Vandalism in Passenger Cars.

In the passenger car yard of the Pennsylvania Railroad at Jersey City one night last week a number of new Pullman sleeping and parlor cars were broken open by vandals and the upholstery and decorations were damaged to the extent of over $2,000. The velvet and plush coverings of chairs were cut with knives, carved woodwork was broken and windows were smashed. Nothing is known as to who are the perpetrators of the crime, though it is conjectured that tramps, who had been driven away from the yards, may be the guilty ones.

The Delaware River Channel.

The people of Philadelphia and thereabouts are making a strong effort to secure Congressional action for a continuous 30-ft. channel in the Delaware River, not less than 600 ft. wide. Major Raymond, Corps of Engineers, U. S. A., estimates the cost of completing such a channel at about $6,000,000.

The Great Wheel of Paris.

The Eiffel Tower, the great attraction of the Paris Exposition of 1889, will be rivaled, if not surpassed, by the great wheel which is to be the particular attraction of the fair in 1900, and which was set in motion on Oct. 11 last. This is the largest wheel ever built, being 100 meters (328 ft.) high, or about 78 ft. higher than the Ferris wheel. The large wheels erected in London and Vienna are said to have proved successful financially, and it is therefore expected that the Paris enterprise will succeed. The wheel has 40 cars and can carry 1,600 persons at each trip, a trip occupying 15 minutes. The price of a ride for one complete revolution will be one franc.

Electric Railroads in Ghent.

The electric railroads of Ghent will be in operation shortly. The rails, which are 12 meters long and weigh 47 kg. per running meter (about 95 pounds per yard), are bent cold. A chain is clamped at each end of the rail and drawn by a screw or turnbuckle. The gage of the track is 1 meter. There are 156 switches, 20 crossings of other tramways, 7 crossings of railroad lines and 7 drawbridges.

The Laboratory and the Railroad.

The first lecture of the Purdue Railroad Course for the year 1898-9 was given Nov. 29, by Dr. Charles B. Dudley, Chief Chemist of the Pennsylvania Railroad. Dr. Dudley's subject was "The Relation of Chemistry to the Railroad." The speaker said that the purchasing agent of the Pennsylvania Railroad spends from $17,000,000 to $20,000,000 a year, and of that amount about $5,000 goes for rubber bands, $7,000 for lead pencils, $1,000 for pins, $5,000 for ink, $2,000 for toilet soap, $1,000,000 for lumber, $60,000 for hose; and he called attention to the fact that it costs nearly as much for stationery with which to carry on the business of the road as it does for iron. Dr. Dudley took up the subject of specifications and showed how they are built up and the methods of obtaining the information from which they are compiled. As an illustration he gave in detail the Pennsylvania Railroad specification for car axles. These specifications contain not only information for the guidance of the manufacturer, but as well for the purchasing agent, inspector and tester. He showed that it was the duty of the chemist not only to write specifications and test materials, but to investigate special problems on a great variety of subjects, and related many instances from his own experience, which showed the wide range of information and ingenious application of new methods which have been called into play in the solution of these various problems which have arisen from time to time.

The Baltic-Black Sea Canal.

Consul-General Holloway writes from St. Petersburg, Nov. 24, 1898: "During the fall of 1897, the Paris edition of the New York Herald published a statement with a map showing plans for a ship canal to connect the Baltic Sea with the Black Sea, the least width of which was to be 213 ft. at water level and 114 ft. at the bottom, so that the largest battleships could pass through it at a reasonable speed. This article was reproduced in many leading American newspapers, and I received a large number of letters from engineers, newspapers, contractors, and manufacturers of excavating machinery, asking for specifications, cost of labor, details as to contracts, etc. I called on Prince Hilkoff and asked if there was any foundation for the statements contained in the article. He said: 'Some time since a French engineer called on me with the map from which this is copied, as well as an estimate of the cost of building the same. I asked where he procured the data his estimates were based upon. He said: "From Russian maps." I then informed him that there were no correct maps of that portion of Russia, and

his canal was 900 miles short.' The Prince added that the Russian Government had no idea of building such a canal; indeed, he doubted if there was sufficient money in Russia to do so. There had been discussions in the past as to the propriety of building a canal connecting the Black and Baltic seas large enough to enable gunboats to pass through, but its cost prevented its serious consideration."

Grand Trunk General Office Building.

The proposed general offices of the Grand Trunk Railway, to be erected in Montreal, will occupy the entire square bounded by McGill, St. Paul, William and Jubilee streets. The building will be 135 ft. x 200 ft.; the location is central and convenient. The architect is Mr. R. A. Waite, designer of a number of public buildings in Canada. The Grand Trunk Building will combine richness and breadth with dignified simplicity. The style is Nev-Grec, being a modern adaptation of Greek and Roman architecture. The ground floor is arranged for the Treasurer's and Paymaster's offices and audit departments, these using 16,000 ft. The first floor will be occupied by the Purchasing Agent, Division Freight Agent, Freight Claims Agent and Auditor. The second floor will contain the General Manager's office, General Assistant's office, General Traffic Manager's office, general passenger and ticket and advertising departments, general freight department and General Solicitor's office. On the third floor will be the General Superintendent, Chief Engineer, Car Service Agent and General Car Accountant and the telegraph and telephone departments. In the fourth story will be assembly rooms and offices of the superannuation, medical and stationery departments.

The Chicago Lake Front.

In a friendly suit between the Lincoln Park Commissioners and A. H. Revell and others, of Chicago, the Supreme Court of Illinois on Dec. 21 decided that the submerged lands of the lake are the property of the people of the state. The Court holds that the shore owner can only have access to the water and acquire such accretions as occur by ordinary processes of nature, and that he has no right to build piers, docks or wharves out into the lake without special legislative permission. The case is remanded to the Circuit Court, with directions to grant a perpetual injunction against the erection of piers by Mr. Revell, and abating piers now existing. As the United States Supreme Court has held that each state can settle questions of this kind for itself, the defeated parties have no further recourse. The decision affects the lake shore from the Indiana to the Wisconsin state line, a distance of about 63 miles, and it leaves the way clear for the state to proceed against the Illinois Central to reclaim the docks which that corporation has built into the lake.

Electric Tramways in Italy.

An Italian engineer, Minarini by name, in a discourse recently delivered in Milan, described the present status of electric tramways in Italy. The first of these was opened in Florence, September, 1890. This is a trolley road seven kilometers long, on the Thomson-Houston system. This was followed by a road of two kilometers (Siemens & Halske), opened in 1892 at Genoa, and the next one to be put in service was in Milan in 1893. From that time the interest developed fast in Genoa, Florence, Rome, Turin, Leghorn and Milan. During 1899 Genoa and the Riviera will have a total electric railroad system of 66.9 kilometers, worked by three different companies, which hold concessions for 40 years, 55 years and 90 years each. Florence and its suburbs will soon be served by a system embracing 10 different lines, with a total development of 51 kilometers. This, like the systems mentioned before, will be worked by the overhead trolley. In Florence the cars are provided with an electro-magnetic brake, which, from the description, is nearly, if not quite, identical with those with which we are familiar in this country. The Florentine Company has a concession for 50 years. At Rome an electric system was opened Sept. 19, 1895. The present length of line is 15.7 kilometers, which will soon be developed to 40 kilometers. At Turin the electric tramways were opened in April, 1895, and are worked by two companies. One of these, the Upper Italy Electrical Company, works on a mixed system of overhead trolley and storage batteries. The other uses the overhead trolley in part, and in part an underground conductor, the city authorities not permitting the use of overhead wires in the central parts of the city. Together these two systems will have a total development of 102.4 kilometers. In Milan the tramway system is 64 kilometers long, with 94 kilometers of track. The tracks are laid by the city and the overhead system is built by the Edison Company, which will also furnish cars and will work the road for the account of the city.

LOCOMOTIVE BUILDING.

The Aldrich Mining Co., Winfield, Ala., Mr. T. H. Aldrich, President, is in the market for one small narrow-gage locomotive.

We are informed, but not officially, that the Wisconsin Central has ordered seven 10-wheel locomotives from the Brooks Locomotive Works, like those last ordered.

The Michigan Central is getting 20 new boilers from the Schenectady Locomotive Works for engines which are now being built at its own shops. Two of the boilers are for 10-wheel and 18 for 8-wheel engines.

Last week we noted that the Chicago Great Western had placed an order with the Baldwin Locomotive Works for 10 locomotives. They will all be 10-wheelers, five being simple engines and the other five two-cylinder compounds.

The large sample mogul locomotive which the Brooks Locomotive Works are building for the Mexican Central, as noted in our issues of Oct. 28 and Nov. 4, has steel castings almost entirely. We are advised, unofficially, that the road is also preparing plans for some consolidation engines.

CAR BUILDING.

It is reported that the Midland Terminal, of Colorado, will let 100 cars.

The Manistee & Northeastern is building 10 box cars at its shops at the rate of two a month.

We are informed, but not officially, that the Kansas City, Pittsburgh & Gulf will order more freight equipment.

The Brainerd & Northern Minnesota is reported to be in the market for from 50 to 75 cars for carrying stone and timber.

We are informed, but not officially, that the Wabash is preparing to order several hundred freight cars early in the year.

It is reported that the Columbus, Sandusky & Hocking has let 900 freight cars, 600 of which were given to the Ohio Falls Car Mfg. Co.

In our issue of Dec. 16 we stated that the Chicago Great Western was asking for propositions for 700 box cars. These cars have been let to the Michigan Peninsular Car Co.

It is reported that during the next year the Rio Grande Western will order 1,000 stock cars, 100 of which are about being let. This road recently ordered 450 freight cars from the Missouri Car & Foundry Co.

We understand that the Mexican Central is preparing plans for new box, stock, coal and flat cars, of 60,000 lbs. capacity, to have pressed steel body bolsters and malleable iron castings throughout. The trucks will have cast steel transoms and bolsters. The information is reliable, but not official. We have no information as to when orders for these cars will be placed.

The Kansas City, Pittsburgh & Gulf will receive bids until Jan. 2 for 50 furniture cars. The contract will be let immediately thereafter, as early delivery is desired. These will be 50 ft. long inside, will weigh 29,000 lbs., and will have a capacity of 60,000 lbs. They will have Westinghouse air brakes, Tower couplers, Dunham door fastenings, Chicago-Cleveland roofs, Cloud trucks, Moore-Jones brasses, steel axles and cast iron wheels.

We are officially informed that the Northern Pacific has placed orders for the 10 postal cars and 500 flat cars previously mentioned in this column with the Barney & Smith Car Co., and that this road is also asking bids on 20 first-class coaches. The plans and specifications for the coaches have not been entirely completed and the matter will probably not be decided until the middle of January. The note published in our issue of Dec. 16 was in error in stating that this road was considering 80,000-lb. box cars, as there is no intention of ordering box cars of that capacity.

The J. G. Brill Co. is building 30 cars for the road between Guadaloupe and San Angel, Mex. (See Electric Railroad Construction column.)

The Akron Street Railway & Illuminating Co. will want an entire new equipment of cars when reorganized. (See Electric Railroad Construction column.)

The Saco River Electric Railroad of Maine will need 20 cars, 18 of which are to be motor and two trailer cars. (See Electric Railroad Construction column.)

The Birmingham Railway & Electric Co., of Birmingham, Ala., has recently bought 11 cars from the St. Louis Car Co. (See Electric Railroad Construction column.)

The East Side Electric Co., of Kansas City, Mo., now rebuilding, will require an entire new equipment of cars, six in number. (See Electric Railroad Construction column.)

The Quakertown Traction Co., Quakertown, Pa., will need about eight open and four closed cars when the extension which is now being built is completed. (See Electric Railroad Construction column.)

BRIDGE BUILDING

BALTIMORE, MD.—B. H. Mays, Superintendent of Bridges, reported to the County Commissioners that he had closed the bridge on Hahn Ave., near Arbutus Station on the Baltimore & Potomac RR., also the bridge at Halethrope in the same district.

BAY CITY, MICH.—The swing bridge at Cass Ave. is reported in a bad condition and about to collapse. The city is considering the advisability of replacing it with a new one.

CARADOC, ONT.—The Middlesex County Council will build a bridge over the river Thames, between Caradoc and Delaware.

CHICAGO, ILL.—The injunction suit restraining the Sanitary District Commissioners from completing the terms of the contract for the Campbell avenue bridge was called before Judge Brentano Dec. 19. The injunction was issued because the Drainage Board advertised for bids on alternative plans, and then awarded the contract for what it regarded as the best plan instead of to the lowest bidder. Judge Payne held that this was illegal and granted a temporary injunction, from which the board appealed to the Appellate Court. The trial is for the permanent injunction. In the meanwhile the board advertised for bids again, confining itself to one set of specifications, which were opened Dec. 28. (Dec. 16, p. 901.)

CLEVELAND, O.—Chief Engineer Geo. W. Kittridge, of the Cleveland, Cincinnati, Chicago & St. Louis, is considering plans for the bridge to be built over the Cuyahoga River. (Oct. 21, p. 766.)

CLIFTON, KY.—Edwin Thacher, Engineer, 16 Savings Institute, Paterson, N. J., informs us that the bridge to be built at Clifton, Woodford county, Ky., is to be a highway bridge of 100 ft. span, with 40 ft. roadway. The commissioners will probably invite only a few companies to bid.

FREMONT, NEB.—A new highway about to be built will require a bridge over Maple Creek for its continuation. The Town Board of Supervisors have the matter in consideration.

HALIFAX, N.S.—Charles E. Church, Commissioner of Public Works, has given notice that it is proposed to build a steel bridge across the channel leading from Lunenburg Bay to Upper South Cove.

JEFFERSON, WIS.—The contract for building the iron bridge across Crawfish River, west of Jefferson, was awarded Dec. 17 to the Milwaukee Bridge & Iron Company at $4,800.

KANSAS CITY, MO.—A steel bridge is to be built at McGee street for a street railroad.

KENOSHA, WIS.—Several bridges will be built in the city by a street railroad applying for a franchise. (See Electric Railroad Construction column.)

KINGSBRIDGE, MASS.—Bridge Commissioner William J. Marvin, who has charge of the Boston and Cambridge bridges across the Charles River, recommends, in his annual report, just issued, the building of two new bridges in addition to the new West Boston bridge. The old Craigie bridge should be replaced, also a new bridge will be built in place of the North Howard street bridge, which connects Cambridge and Brighton.

LEXINGTON, MO.—Senator Cockrell introduced in the U. S. Senate Dec. 19 a bill authorizing the building of a wagon and foot bridge across the Missouri River at Lexington. The franchise granted to the Lexington Terminal Co. in 1894 to build a bridge across the river at this point has expired by limitation. A bill similar to Senator Cockrell's was introduced in the House of Representatives by Congressman Cowherd. (Nov. 25, p. 850.)

LITTLE ROCK, ARK.—The House of Representatives on Dec. 20 passed the Senate bill authorizing the Choctaw & Memphis RR. to build bridges across the Arkansas and other rivers in the state of Arkansas.. (Dec. 23, p. 921.)

MC MINNVILLE, ORE.—The Board of County Commissioners has authorized the building of two bridges on public roads lately opened. C. E. Du Kenfield, Clerk, Yarnhill county, McMinnville, Ore.

MONTGOMERY, ALA.—A bill is now pending in the Senate to authorize the commissioners of Tuscaloosa county to build a bridge across the Warrior River at or near Fester's Ferry, also to issue bonds for it.

NEW KENSINGTON, PA.—The County Court has been petitioned for a bridge over the river at New Kensington. B. R. Kline, Town Attorney.

OTTAWA, ONT.—The bridge to be built over the Rideau Canal at Main street is to be a steel structure and cost $40,000. (Dec. 23, p. 921.)

PENN, PA.—A bridge is in contemplation across the Pennsylvania RR. at the station.

PITTSBURGH, PA.—The Wilkensburg & East Pittsburgh St. Ry. Co. will need three bridges on its line. (See Electric Railroad Construction column.)

QUAKERTOWN, PA.—The Quakertown Traction Co. will need four bridges on its line. (See Electric Railroad Construction column.)

QUEBEC, QUE.—The Quebec Bridge Co., Ltd., has decided to make March 1 the date for proposals for the building of the bridge over the St. Lawrence River at Quebec.

RANDOLPH, N. Y.—Plans are being considered for building two bridges at railroad crossings by the State Railroad Commission. One is to be on Fifth avenue and the other on Jamestown street, both crossing the Erie RR.

ST. LOUIS, MO.—A steel bridge is to be built over the Piasa Creek to replace the present wooden structure.

ST. PAUL, MINN.—It is estimated that $15,000 will be necessary to repair the two spans of the Sixth street bridge which were recently damaged.

SAN FRANCISCO, CAL.—The San Francisco & San Joaquin Valley RR. will build a 240-ft. bridge across the San Joaquin River at Stockton. The plans are now being prepared. A steel viaduct half a mile long is also to be built over the Alhambra Valley.

SEAFORTH, ONT.—The County Commissioner has recommended that a steel bridge, 100 ft. long, with concrete abutments, be built at Summerhill next spring; also a bridge 20 ft. long at the boundary line of Hullett and McKillop.

TOPEKA, KAN.—The Chicago, Rock Island & Pacific, in continuing its improvements on the line, will replace 25 wooden bridges with iron structures during 1899. W. E. Dauchy, Superintendent of Maintenance and Construction, Topeka.

TROY, N. Y.—The Albany Ry. Co. is to build a new bridge across the canal at J. M. Jones' Sons Car Works in Troy.

VICTORIA B. C.—City Engineer E. A. Wilmot informs us that no decision has yet been arrived at as to whether a bridge or a causeway will be constructed across the James Bay Flats. (Dec. 16, p. 901.)

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Chicago & Eastern Illinois.—Preferred, quarterly, 1½ per cent.; common, quarterly, 1½ per cent., payable Jan. 2.

Denver & Rio Grande.—Preferred, semi-annual, 2 per cent., payable Jan. 16.

New York Central & Hudson River.—Quarterly, 1 per cent., payable Jan. 16.

Norfolk & Southern.—Quarterly, 1 per cent., payable Jan. 10.

Baltimore Consolidated Ry.—Semi-annual, 2½ per cent., payable Jan. 15.

United Traction & Electric Co., Jersey City.—Quarterly, ¾ per cent., payable Jan. 3.

Northwest Railway Club.

At the November meeting of the Northwest Railway Club, held Tuesday evening, Nov. 15, at the Ryan Hotel, St. Paul, three papers were presented. The first paper was by Mr. Alfred Lovell, Assistant Superintendent of Motive Power of the Northern Pacific, entitled "Test of Materials and Their Purchase Under Specifications," in which the practice of buying under specifications was strongly advocated. In view of the recent discussion of this subject the paper has an increased value. The second paper was by Mr. G. L. Warren, Mechanical Engineer of the Chicago, St. Paul, Minneapolis & Omaha, which gave a short account of the uses to which compressed air is put in the main shops of that road. The third paper was by Mr. T. A. Foque, Assistant Mechanical

Superintendent of the Minneapolis, St. Paul & Sault Ste. Marie, entitled "The Railroad Draughting Room." This is a subject which has received little general attention, but Mr. Foque clearly showed that it is an important part of the mechanical department.

Engineers' Club of St. Louis.

The annual dinner was held at the Mercantile Club Dec. 21, at 8:15 o'clock. Forty-one members and 18 visitors were present. After the dinner had been served, the meeting was called to order by President Bryan, who announced that the result of the letter ballot for officers for 1899 had been as follows:

President .....B. H. Colby
Secretary .....E. R. Fish
Treasurer.....Thomas B. McMath
Librarian.....E. J. Jolley
Directors.....J. H. Kinealy and John A. Laird

Members of the Board of Managers of the Association of Engineering Societies—
J. B. Johnson and Richard McCulloch

There was no one elected Vice-President, as none of the candidates had received a majority of the votes cast.

The first toast on the programme, "The Engineer of To-day," was discussed by Mr. William H. Bryan.

Col. E. J. Spencer spoke on "Our Late Unpleasantness" and gave a short sketch of the Cuban war.

Mr. Richard McCulloch then responded to the toast, "Our Bachelors."

Prof. J. H. Kinealy spoke on the toast, "The Engineer in Mechanics." He stated that the study of mechanics is the basis of all engineering, and that when a student had mastered this subject he had laid a firm foundation for future work.

The President then called upon Mr. Robert Moore to speak on "The Engineer as a Citizen." Mr. Moore warned engineers not to allow an interest in engineering to absorb their attention so completely as to prohibit them from performing the duties of a good citizen.

Informal remarks were made by Mr. M. L. Holman and ex-Governor F. A. Tritle of Arizona.

Western Railway Club.

The Western Railway Club held a meeting Tuesday afternoon, Dec. 20, at the Auditorium Hotel, Chicago. The Secretary read the names of six new members. An invitation for the Club to visit the Niles Tool Works, at Hamilton, O., on Jan. 18 was accepted.

M. C. B. Couplers.

The committee appointed at the October meeting to consider the subject of M. C. B. couplers and knuckles reported progress. A circular letter has been sent out to members and others asking for data from which statistics can be compiled regarding the kinds of couplers in use, and the cause and extent of trains breaking in two due to coupler failures; also the length of the guard arm and the type of locking device which is considered best. The committee has classified all couplers of which it has knowledge, according to the number of each kind in use. In the first group of 5,000 and more in use, there are 17 kinds of couplers; in the second group, of from 5,000 to 1,000 in use, there are 21 kinds, and there are 34 kinds of couplers in the third group, of less than 1,000 in use. A number of replies to this letter have already been received, but a final report will probably not be ready for several months.

Tests of Coal.

As previously announced, a paper was presented by Mr. William Garstang, Superintendent of Motive Power of the Cleveland, Cincinnati, Chicago & St. Louis, entitled "Tests of Coal for Locomotives." This paper embodied the results of very extensive tests to determine the value of five kinds of coal on the locomotive testing plant at Purdue University; the same kinds of coal were also tested in freight service under Mr. Garstang's direction. The shop test was made by Prof. Goss, and is probably the most complete investigation of the kind that has been made. The results of the road tests were found to confirm the conclusions drawn from the tests made at Purdue. The most important conclusion from an operating point of view was that the cheapest fuel tested, although giving the lowest evaporation and the greatest percentage of ash and clinker, resulted in the lowest net cost per ton of freight handled, solely because of its price. In this connection, however, it should be noted that the discussion developed the fact that the poorest coal of the test was really a very fair grade of coal, and that there is a well defined limit as to how poor a quality of coal can be used to advantage. The discussion of the paper took up so large a portion of the time that the topical discussion of the kinds of locomotive grates in use was brief.

Two papers will be presented at the next meeting, one entitled "High Speed Locomotives" and the other "Coverings for Locomotive Boilers." The latter will be based upon the results of the tests made last summer by Prof. Goss on the Chicago & Northwestern road near Clinton, Ia.

PERSONAL

—Col. Daniel Morris, who was appointed State Surveyor of Railroads in Pennsylvania about 1845, and in 1852 located the Camden & Atlantic RR., died in Atlantic City Dec. 21. He was 79 years old.

—Mr. Justice B. Rice, who was until two years ago Superintendent of the Fergus Falls Division of the Great Northern, died in St. Paul, Minn., Dec. 16. Mr. Rice was born in Woodstock, Vt., in 1830. In 1856 he went West and became connected with Minnesota railroads.

—Mr. George P. Hodgman, who has been in charge of the erection of locomotives at the Baldwin Locomotive Works for two years past, died in the United States of Colombia on Nov. 29, where he went in October last with a locomotive built for the Cauca Railroad. The particulars of his death are not yet known here. Mr. Hodgman was the first person to pass through Stevens Institute on the Master Mechanics scholarship, and he graduated from that school in 1894. Before entering Stevens, he spent a few years in locomotive shops, studying the details of engine design, and the best methods of handling machinery in the shop. His graduating thesis, treating of the relative merits of electric and shaft drive, was probably one of the most complete and careful analyses of this problem, based on careful tests, that have been undertaken. His father, Mr. Samuel A. Hodgman, was formerly Supt. M. P. of the Philadelphia, Wilmington & Baltimore.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—B. Johnson has been appointed Master Mechanic of the shops at Topeka, Kan.

Baltimore & Ohio.—J. F. Legge has been appointed Terminal Agent at Washington, D. C., in charge of Freight and Passenger Stations; effective Jan. 1. Mr. Legge was at one time Superintendent of the Fourth and Fifth Divisions of the B. & O. He was in charge of the Washington Terminal from 1884 to 1887.

Baltimore & Ohio Southwestern.—Archibald Fries has been appointed Assistant General Freight Agent, with office at Cincinnati, O. He succeeds W. W. Peabody, Jr., resigned. Mr. Fries was heretofore General Agent at that point.

C. Tomlinson has been appointed General Agent, succeeding Mr. Fries. Mr. Tomlinson has been General Agent of the Continental Fast Freight Line at Kansas City.

Butte, Anaconda & Pacific.—J. C. Patterson has been appointed Chief Engineer, with headquarters at Anaconda, Mont. He was heretofore Resident Engineer of the Great Northern at Great Falls, Mont.

Chesapeake & Ohio.—J. W. Hopkins, heretofore Coal and Fuel Agent at Richmond, Va., has resigned. The office has been abolished. Geo. W. Benjamin, General Coal Freight Agent, with headquarters at Cincinnati, O., who has had charge of the westbound coal, will assume the duties of the position lately abolished. Mr. Benjamin will also have charge of eastbound coal business.

Chicago & Northwestern.—D. W. Aldridge, heretofore Traveling Passenger Agent at Cleveland, O., has been appointed General Agent of the Freight and Passenger Departments, with office unchanged; effective Jan. 1.

Chicago, St. Paul, Minneapolis & Omaha.—F. L. Bacon has been appointed General Agent, with headquarters at West Superior.

Cincinnati, Hamilton & Dayton.—Geo. E. Gillman, formerly Agent at Detroit, Mich., has been appointed Michigan Passenger Agent, with headquarters at the same place.

Cincinnati, New Orleans & Texas Pacific (Q. & C.)—W. B. Blanton, heretofore Trainmaster on the Columbus, Sandusky & Hocking, has been appointed Trainmaster of the C., N. O. & T. P., with headquarters at Lexington, Ky.

Cleveland, Cincinnati, Chicago & St. Louis.—Joseph Keavy, Division Freight Agent at Benton Harbor, Mich., will have his headquarters moved from that point to Indianapolis. He will continue in charge of the Michigan Division, however, and agents of that division will continue to report to him at Indianapolis, Ind.

Columbus, Sandusky & Hocking.—W. D. Blanton, Trainmaster at Columbus, O., has resigned. A. O. Williams is his successor.

Detroit & Lima Northern.—H. A. Wilson has been appointed Traveling Passenger Agent, with headquarters at Detroit, Mich.

Fort Worth & Denver City.—E. A. Hirshfield, Assistant General Passenger Agent, with headquarters at Fort Worth, Tex., has resigned.

Genesee & Wyoming Valley.—Frank Rundio, heretofore General Manager, has resigned. The duties of this position are being performed by D. Hyman, Receiver. (Dec. 8, p. 887.)

Georgia & Alabama.—C. P. Hammond has resigned as Chief Engineer. W. R. Beauprie has been appointed roadmaster in charge of Maintenance of Way, with headquarters at Savannah, Ga. A. T. Maxwell has been appointed Commercial Agent at Jacksonville, Fla.

Grand Trunk.—A. R. McIntyre has resigned as Assistant Superintendent, with headquarters at Battle Creek, Mich.

International & Great Northern.—W. T. Musick, Traveling Freight and Passenger Agent, with headquarters at Palestine, Tex., has been appointed General Eastern Agent, with headquarters in New York. He succeeds E. N. Andrews, Commercial Agent, resigned.

Interurban.—The officers of this company, referred to in the Construction column, are: Winslow Mason, President and General Manager; John A. Heany, Vice-President; M. E. Gibson, Secretary; Henry C. Hiles, Treasurer; W. T. Forsythe, Chief Engineer; Chas. P. Sherman, Counsel; Thomas Bromley, H. W. Lambirth, S. M. Hess, J. Preston Thomas, Dr. G. Morris Philips, S. W. Smith, M. E. Gibson, C. T. Shields, Wm. Garrett, A. F. Johnson, Chas. O. Beaumont, M. S. Way, I. G. LeFevre, W. Mason, W. M. Franklin, Directors.

Kansas City & Independence Air Line.—F. S. Stimson, who was heretofore Freight Conductor on the Toledo, St. Louis & Kansas City, has been appointed Superintendent of the terminals of this line and the Kansas City Belt Line, with headquarters at Kansas City, Mo.

Kansas City, Memphis & Birmingham.—The car records of this line, heretofore handled at Memphis under Superintendent J. H. Sullivan, have been, under the recent reorganization, placed in charge of J. H. Ashley, and the headquarters of the car service accounts have been moved to Kansas City.

Kansas City, Pittsburgh & Gulf.—J. H. Emmerts, lately Superintendent of the Kansas City, Fort Scott & Memphis, has been appointed Chief Clerk to General Manager and Chief Engineer Gilham.

Lake Erie & Western.—It is reported that Geo. Lewis Bradbury, heretofore Vice-President and General Manager of this road, has been chosen President of the system, succeeding the late Calvin S. Brice.

Lake Shore & Michigan Southern.—A. C. Robson, Master Car Builder at Buffalo, N. Y., and J. R. Reniff, Master Car Builder at Norwalk, O., have resigned. No car building work is being done in Norwalk, O., and freight car work which has hitherto been done in the shop at Buffalo is being done in the New York Central shops at Depew, East Buffalo.

Lehigh Valley.—Chas. Hartshorne has resigned as Vice-President. It is reported that he will continue to act as a member of the Board of Directors, and he will also fill the executive offices which he holds of subsidiary lines controlled by the L. V.

Louisiana & Arkansas.—The position which Elmer Richards has taken is that of General Manager. He succeeds J. Buchanan, who has left railroad service. (Dec. 16, p. 903.)

Michigan Central.—D. J. Hackett has been appointed Trainmaster of the Toledo Division, with headquarters at Toledo, succeeding C. Haire, transferred. (Dec. 23, p. 923.)

Muscatine North & South.—The officers of this road, which will be opened for traffic Jan. 20, are as follows: W. R. Stewart, Jr., President and General Manager, Muscatine, Ia.; Henry Levis, Vice-President, Philadelphia, Pa.; Henry Jayne, Secretary and Treasurer, Muscatine, Ia.; R. M. Darley, General Freight and Passenger Agent and Auditor, Muscatine, Ia.; A. L. Lindner, General Agent, Muscatine, Ia. The headquarters are at Muscatine, Ia.

Nashville, Chattanooga & St. Louis.—Edward W. Schofield, heretofore Traveling Freight Agent, with headquarters in Chattanooga, Tenn., has been appointed Commercial Agent, with headquarters at the same city.

Norfolk & Western.—W. Hale is Acting Trainmaster of the Kenova Division, with headquarters at Kenova, W. Va. He succeeds D. Spangler. (Dec. 23, p. 923.)

W. Connelly, Trainmaster at Kenova, W. Va., succeeds A. W. Towsley. A. C. Needles, Assistant Trainmaster at Bluefield, W. Va., has been transferred to the Norfolk Division as Trainmaster.

Northern Pacific.—Howard Curry has been appointed Road Foreman of Engines for the main line and branches east of Mandam, N. D.

Pennsylvania.—Important changes are scheduled to go into effect Jan. 1: General Superintendent F. L. Sheppard, of the Pennsylvania Division, at Altoona, Pa., has been promoted to the position of General Superintendent of the United Railroads of New Jersey Division, succeeding F. Walcott Jackson, at Jersey City, who becomes President of the roads forming that division. General Superintendent J. M. Wallis, now of the Philadelphia & Erie Division, with headquarters at Williamsport, Pa., succeeds Mr. Sheppard. G. W. Creighton, Division Superintendent of the Middle Division, at Harrisburg, Pa., succeeds Mr. Wallis. M. H. Myers, Division Superintendent at Reading, Pa., succeeds Mr. Creighton. R. M. Patterson, Division Superintendent of the Delaware Extension and Kensington Division, at W. Philadelphia, becomes Superintendent of the New York Division. D. H. Lovell, of the Monongahela Division, at Pittsburgh, Pa., succeeds Mr. Patterson. Division Superintendent Frank Robb, of the Cambria & Clearfield Division, succeeds Mr. Lovell, with headquarters at Pittsburgh, Pa. F. P. Abercrombie, of the Bedford Division, succeeds Mr. Robb, at Cresson, Pa. E. F. Brooks, heretofore Division Superintendent at Jersey City, becomes General Superintendent of the Philadelphia, Wilmington & Baltimore Division. Victor Wierman, Superintendent of the Lewistown Division, with headquarters at Lewiston Junction, Pa., succeds J. W. Moss, of the Frederick Division. Mr. Moss goes to the Schuylkill Division as Division Superintendent.

Philadelphia & Reading.—The officers of the Shamokin Division, heretofore located at Shamokin, Pa., will be transferred to Tamaqua, Pa.; effective Jan. 1.

Plant System.—G. L. Caldwell, Traveling Freight Agent, Ocala, Fla., has been transferred to Valdosta, Ga. Robert Taylor has been appointed Traveling Freight Agent, with headquarters at Ocala.

St. Louis, Iron Mountain & Southern.—J. T. Stafford has been appointed Assistant Master Mechanic, with headquarters at Baring Cross, Ark. He was heretofore General Foreman of Locomotive Repairs at that point.

D. D. Strong has been appointed Traveling Engineer. He has succeeded Wm. Bates as Foreman of the Locomotive and Car Department.

St. Louis Southwestern.—The following changes will take effect Jan. 1, 1899:

The office of Assistant General Superintendent, held by W. Coughlin at Tyler, Tex., has been abolished. The train dispatching from the Missouri Division will be done from Pine Bluff, Ark., office instead of Jonesboro, Ark. The office of Assistant General Superintendent, also of Superintendent of the Missouri Division, are abolished. W. Coughlin is appointed Superintendent and F. S. Rawlins is appointed Trainmaster of the Arkansas and Missouri divisions, with headquarters at Pine Bluff, Ark. S. W. Kenard, Superintendent Arkansas Division, and J. W. Metcalf, Trainmaster Missouri Division, are transferred to other duties. E. Richards, Trainmaster Arkansas Division, has resigned to accept service elsewhere. Ernest Galbraith will on Jan. 1 become Master Mechanic of the Black and White River Railway shops in Brinkley, Ark.

Southern.—Geo. C. Daniels, Traveling Passenger Agent for the Southern in Boston, has had his title changed to that of New England Passenger Agent.

J. A. Keith has been appointed Trainmaster at Macon, Ga.

H. F. Carey has been appointed Traveling Passenger Agent, with headquarters at Macon, Ga.

Spokane Falls & Northern (G. N.).—F. S. Forest has been appointed Assistant Superintendent, with headquarters at Spokane, Wash.

Tacoma & Columbia River.—The following directors have resigned: A. M. Ingersoll, Henry Hewitt, Wm. Jones, W. C. Wheeler and C. M. Shultz.

Texas Midland.—A. S. Vest has resigned as Commercial Agent at St. Louis. The office has been abolished.

Wabash.—R. C. Cline has been appointed Pacific Coast Agent for the Passenger Department, with headquarters at Los Angeles, Cal. The appointment takes effect Jan. 1.

Wheeling & Elm Grove.—W. S. Wright has been appointed General Manager, with headquarters at Wheeling, W. Va., succeeding H. E. Weisgerber, resigned.

RAILROAD CONSTRUCTION, New Incorporations, Surveys, Etc.

ARKANSAS & CHOCTAW.—Track has been laid during the year for 13 miles in Arkansas, and two miles in Indian Territory, completing the line beyond Choctaw City. Cahil Bros. have just finished their contract and will probably move away, pending final location through Indian Territory via Goodland and Atoka. (Nov. 18, p. 838.) F. W. Valliant, of Rocky Comfort, Ark., is Chief Engineer, and W. H. Carson, Texarkana, Tex., Superintendent. (Official.)

ASTORIA & COLUMBIA RIVER.—The company does not contemplate an extension from New Astoria, Ore., to Fort Stevens the coming year. (Nov. 11, p. 820.)

BEAUMONT WHARF & TERMINAL.—Building has been suspended for some time owing to lack of adjustment of certain route matters between the mills of Beaumont, Tex., and the railroad company, over whose line the raw material for manufacture is being received. About three miles of the Belt Line is completed. (Sept. 16, p. 678.)

BOYER VALLEY.—This company has filed deeds amounting to over $60,000 for right of way and switching ground in Denison, Ia.; this is practically an extension of the Chicago & Northwestern from Sac City southwest 25 miles to Denison. Marvin Hughitt, President of the C. & N. W. at Chicago, is a director. (Nov. 25, p. 852.)

CANTON, ABERDEEN & NASHVILLE.—Grading is begun, according to report, on the first 10 miles from Winfield to New River, Ala. The line as projected is from the Aberdeen branch of the Illinois Central at West Point, Miss., to run northeast 58 miles to Winfield, Ala., and thence up the Clifty coal basin to New River. The Illinois Central is understood to be back of the project. (Oct. 14, p. 750.)

CHICKASAW CENTRAL.—The Chickasaw Legislature on Dec. 20 passed a charter act granting this company right of way through the Chickasaw Nation from a point on the Missouri, Kansas & Texas, to run northwest through Emet and Tishemingo on the Canadian River. Among the incorporators are: Ex-Governor R. M. Harris, Wm. Rennie, M. V. Cheable, Chas. D. Carter, Treasurer E. S. Moseley and Ex-Governor Wm. Boyd.

CINCINNATI, HAMILTON & DAYTON.—An official writes that there is no truth in the report that the company will build an extension from Piqua, O., north to New Bremen. (Dec. 2, p. 867.)

COLUMBIA SOUTHERN.—In addition to the extension from Biggs, Ore., south to Moro, the company proposes to build next year about 50 miles beyond Moro. The maximum grades for this extension will be 3½ per cent., and the maximum curves 14°. About half of the length will be easy earthwork and the rest rock cutting. (Official.) D. C. O'Reilly, of Wasco, Ore., is General Manager. This extension was incorporated in Oregon Nov. 16 under the Columbia & Klickitat.

DULUTH, MISSISSIPPI RIVER & NORTHERN.—Press reports of some weeks ago stated that the company's line was to be extended within a year north from Hibbing, Minn., to the Canadian boundary, and south into Duluth. The General Manager, however, writes that nothing definite is determined in regard to the matter.

FRANKLIN, SOMERSET & KENNEBEC.—This company has published notices of its intention to apply to the coming session of the Maine Legislature for an extension of time on its charter providing for completing its line from the present northern terminus, Bingham, to Moosehead Lake. L. Atwood, of Farmington, Me., is President. (Sept. 16, p. 678.)

GAINESVILLE, M'ALESTER & ST. LOUIS.—Representative Bailey, of Texas, introduced a bill into the House, Dec. 12, to amend the act granting right of way to this company through Indian Territory by extending the time for a period of three years. It was referred to the Committee on Indian Affairs. This company was incorporated in 1893, to build from South McAlester, I. T., southwest 125 miles, via Lehigh and Colgate to Gainesville, Tex. (March 17, 1893, p. 217.)

GREAT NORTHERN.—President Hill writes that there is no truth whatever in the report that his company contemplates the extension of its line from Spokane to Portland, Ore. (Dec. 9, p. 885.)

HOLSTON VALLEY.—Surveys are reported in progress for an extension of this line from the terminus in Johnson county, Tenn., into timber lands. The road now runs from Bristol, Tenn., to Big Creek, nine miles.

HUMBOLDT, DYERSBURG & TIPTONVILLE.—This company has been incorporated in Tennessee with a capital stock of $1,500,000, to build a line through Humboldt, Gibson Co., at the junction of the Louisville & Nashville and the Mobile & Ohio, to run northwest to Dyersburg, and thence north to Tiptonville, about 60 miles. The incorporators are: F. S. Bates, J. S. McTighe, J. D. McClerkin, W. H. Tucker, J. M. Parker, W. F. Fowler and John F. Hamilton. The section of this line between Dyersburg and Tiptonville is probably the same as that proposed by the Stevens Lumber Co. (New Roads, Oct. 21, p. 768.)

HUTCHINSON & SOUTHERN.—The extension from Blackwell, Okla., is to be built during the coming year. It will extend south 17 miles, and the company expects to have it in operation by March 1, 1899. (Dec. 9, p. 885.)

INTERURBAN.—A prospectus has been issued announcing the proposed building of this line, which was projected several years ago to run from Philadelphia, Pa., west to Lancaster. It passes through Delaware, Chester and Lancaster counties by way of Willistown Inn, West Chester, Unionville and Quarryville, where connection is to be made with the old Quarryville line into Lancaster. Entrance into Philadelphia will be over the Baltimore & Ohio. An issue has been made of $1,000,000 of 5% 40-year gold bonds at $12,000 a mile. The officials are given under Elections and Appointments.

KANSAS & SOUTHERN.—This company, which was incorporated in Kansas Dec. 3, with a capital stock of $100,000, is to build a line in Pottawotamie county, to connect either with Blaine or Wheaton, Kan. The prospects for building are reported good, and contracts for grading, etc., will be let within 30 or 40 days. The Southern Construction Co. of St. Louis has the general contract. The work will be of an ordinary character. (Dec. 9, p. 885.) Part, at least, of the material has been secured. Irving H. Wheatcroft, of St. Louis, Mo., is a promoter of the road. (Official.)

KANSAS, OKLAHOMA CENTRAL & NORTHWESTERN.—Representative Broderick on Dec. 12 introduced a bill amending the act granting a right of way to this company, approved Dec. 1, 1893, and extending the privileges approved Feb. 15, 1897, so that the time for building the first 100 miles is extended until Dec. 21, 1901. It further provides that the company shall have power to build and operate branches from its main line at or near Bartlesville, I. T., southeast through the Cherokee Indian Nation, and through the Creek, Seminole and Chickasaw Nations to a point on the Texas state line, and thence to Sherman, in the state of Texas, via Collinsville, Okmulgee, Wenoka and Tishomingo; also a branch from its main line near Stillwater, Payne county, O. T., to run southwest through the counties of Lincoln, Pottawotamie and Cleveland to a point on the south line of Oklahoma Territory, and on the Canadian River, and thence southwest from the Chickasaw Nation to a point on the north boundary in the state of Texas on Red River, and thence to Henrietta, Tex. The intermediate points are Chandler and Shawnee, O. T., and Paul's Valley, I. T. J. H. Bartles, Bartlesville, I. T., is President, and the Knickerbocker Trust Co., New York, its eastern representative. (Dec. 9, p. 885.)

KETTLE RIVER VALLEY.—Senator Wilson introduced into the U. S. Senate, Dec. 12, a bill granting to this company right of way through Colville Indian Reservation in the state of Washington, with branches on the Columbia River, running west and north along the reservation. The branches are to connect at one or more points on the international boundary with any road organized under the laws of the Dominion of Canada or the Province of British Columbia. The bill was referred to the Committee on Indian Affairs.

LAUREL & NORTHWESTERN.—Rails for 22 miles of line are bought, according to report, and will be delivered within a few weeks, and the road will be completed from Laurel northwest through Jones and Smith counties to Raleigh, Mo. The first 10 miles has been in operation for over a year. (Aug. 6, 1897; p. 562.)

LITTLE RIVER COAL RAILROAD & MINING COMPANY.—The Coal River & Southwestern has been organized as successor to this company, and it is proposed to begin building early in the spring from St. Albans, W. Va., to Madison, 50 miles. Henry S. Hopkins, of St. Louis, Mo., has the contract. H. J. Toudy, of Huntington, W. Va., is President. (July 29, p. 555.)

LITTLE RIVER VALLEY.—Representative McRae on Dec. 12 introduced into the House of Representatives a bill authorizing this company to operate a line through the Choctaw and Chickasaw Nations in Indian Territory, from a point on the Arkansas state boundary line in Little River county, Ark, thence west to a point near Atoka, I. T.; thence northwest up the valley of the Washita River to the boundary line between the Chickasaw Nation and Oklahoma Territory; also to build branches to Clarksville and Paris, Tex. The company has completed its line from Morris Ferry to the Indian Territory line. Frank Bates, of Horatio, Ark., is Secretary. (Dec. 16, p. 904.)

MISCELLANEOUS COMPANIES.—The Syracuse RR. Construction Co. was incorporated in New York Dec. 23, with a capital stock of $25,000. The Directors are Clifford D. Beebe, Wm. F. Rafferty and Thomas H. Mather.

The James River Construction Co. has been incorporated in Virginia, with a capital stock of $100,000, by R. Lancaster Williams, A. W. Waddell and others, to do business at Richmond.

MISSOURI, KANSAS & TEXAS.—Referring to reports that the company will build an extension from San Marcos, Tex., to San Antonio, the General Manager writes that it is not the intention at present to build such a line.

MUSCATINE NORTH AND SOUTH.—Official announcement is received that this line is to be completed from Muscatine, Ia., via Fruitland, Grandview and Wapello to Elrick Junction, 30 miles, and opened for traffic Jan. 20, 1899. W. R. Stewart, Jr., of Muscatine, is President and General Manager. (Dec. 2, p. 868.)

NEW ROADS.—The line being built by A. Knabb & Co., of Krug, Garrett County, Md., is a private lumber line, and the company is doing its own grading. (Dec. 16, p. 904.) It is to be extended to Swallow Falls. (Official.)

Robert F. Hoke, of Raleigh, N. C., is reported to have stated that he will make application to the North Carolina Legislature for a charter for the railroad from Cranberry southeast to Lincolnton. This may be in line with the proposed plan of the East Tennessee & Western North Carolina, whose terminus is at Cranberry. (Sept. 16, p. 678.)

C. L. Potter and H. Hulen, both of Gainesville, Tex., are reported to have been recently in Abilene, making propositions to that city to build a line from Gainesville southwest about 200 miles to Abilene. The road will pass through Wise, Jack, Young and Shackelford counties, touching Bridgeport, Jackboro and Graham. The people of Abilene are asked to subscribe $40,000 in cash, and $20,000 in real estate for terminal facilities. The road is reported to be capitalized at $5,000,000, and it is stated that money is ready to build 40 miles without issuing a bond. This portion is already located out from Gainesville.

Surveys are reported in progress for a line from Lyle, Minn., northwest 22 miles to Albert Lea, on the Minneapolis & St. Louis. This may be an extension of the Illinois Central from Lyle to form a connecting link with the Minneapolis & St. Louis, which press reports state has been acquired by the I. C. It is stated that right of way is being secured and the material contracted for.

The Empire Lumber Co., of Winona, Minn., proposes to build a logging road from Dedham, Minn., into the Black River country. Preliminary surveys are made and the rails bought. O. H. Ingram, of Eau Claire, Wis., is President, and Charles Horton, of Winona, Minn., Secretary. (Official.)

A. T. Sullenberger, of Durango, Colo., according to report, is making preliminary surveys for a railroad in La Plata county, Colo., to run from the Denver & Rio Grande, at the head of Cat Creek, north into timber lands.

The Cherokee Iron Co. is reported to have begun work on the 9-mile road from Lyerly, Ga., to the company's iron beds. It is announced that it is to be completed by March 1.

NORTHERN PACIFIC.—Plans have been filed showing the location of 40 miles of the proposed extension of the Washington Central Branch from Coulee City, Ore., to Lakeside, on Lake Chelan. The route as determined is from Lakeside down Chelan River to the west bank of the Columbia; thence northeast along the bank to a point four miles below Virginia City, where it crosses the river and continues southeast along the south bank to Bridgeport. From that point to Coulee City the distance is about 40 miles. (Nov. 11, p. 820.)

PITTSBURGH & ALLEGHENY RIVER.—This company was incorporated in Pennsylvania, Dec. 15, with a capital stock of $30,000, to build a line three miles long from Thirty-second St., Pittsburgh, to Herr's Island, in the Allegheny River. J. H. Park, of Pittsburgh, is President, and the directors are: D. E. Park, Allegheny; W. G. Park, New York City; C. E. Clapp, Geo. Wright, Jr., A. Sutton and G. M. Black, Pittsburgh.

PORTLAND, VANCOUVER & YAKIMA.—Bids will soon be asked, according to report, for the proposed extension northeast 16 miles toward Yakima.

PORTO RICO RAILROAD.—The San Juan & Rio Piedras RR. Co. was incorporated in New York, Dec. 27, with a capital stock of $300,000, to build and operate a steam or electric railroad 7½ miles long from San Juan to Rio Piedras. The directors are: George H. Walbridge, Fernando G. Echeverria, H. H. Harrison, Edward Schmidt, Lathrop R. Bacon, F. Kingsbury Curtis, Philip H. McMillan, Augustin N. Hand and William B. Parsons, of New York City.

RED LAKE TRANSPORTATION.—This company is completing a logging road from Lake Nebish to Red Lake, Baltrain County, Minn., 10 miles, with three miles of branches and it will be open for traffic Jan. 1. The company proposes to build six miles additional on the main line, and some logging branches during the coming year. C. H. Richards of Minneapolis, is President and Treasurer.

ST. LOUIS & O'FALLON.—Contracts are reported let for building this line from East St. Louis, Ill., south 12 miles through O'Fallon to a tract of bituminous coal lands.

ST. LOUIS, GRAND TOWER & SOUTHERN.—M. S. Curtis, locating engineer for this company, reports that he has obtained a favorable route from East St. Louis, Ill., south along the Mississippi River to Cairo, 140.5 miles. The contracts for grading and bridging will be let in January or February. The rails, 80 lbs. in weight, have been contracted for. Sir Charles Jackson Griffith is President, and Victorian St. Clair Dobbins Chief Engineer. This project has been heretofore referred to in this column under the name of the Mississippi Valley. (Sept. 9, p. 656.) Thomas N. Chase, of 534 Collinsville Ave., East St. Louis, was then named as President.

ST. LOUIS, IOWA & DAKOTA.—Articles of incorporation were filed in Iowa Dec. 19, for two allied companies of this proposed line. One is the S. L., I. & D. Town Site Co.; another is the S. L., I. & D. Coal Co., each with a capital stock of $250,000. F. A. Zamen and John A. Berry are among the incorporators of both companies. The St. Louis, Iowa & Dakota is successor to the Sioux City & Baltimore, and proposes to build from Sioux City, Ia., southeast 512 miles to St. Louis. T. P. Gere of Sioux City is President. (Nov. 11, p. 820.)

SISTERSVILLE, PENNSBORO & BURNSVILLE.—This company was incorporated in West Virginia Dec. 22, with a capital stock of $200,000, to build a railroad from a point at or near Sistersville, on the Ohio River in Tyler county, south via Pennsboro to Burnsville, Broxton county, on the West Virginia & Pittsburg. The incorporators are: J. V. Dotts, L. P. Wilson, J. B. Wilson, B. F. Wilson, W. B. Kelly and M. K. Duty.

SMITH'S FERRY.—The company proposes to begin grading early in the spring on this line from Lisbon, O., to East Liverpool, 29 miles. J. L. B. Dawson of Beaver Falls, Pa., is President. (Jan. 21, p. 51.)

SOUTHERN.—Surveys are still in progress for the tunnel through Lookout Mountain, and will not be completed for some time. Nothing has been decided upon yet as to beginning the work. (Official.)

SUMMERVILLE, BLUE MOUNTAIN & WALLA WALLA.—This company has been incorporated in Washington, with a capital stock of $2,500,000, to build the line recently referred to from the new Union, Cove & Valley, in Cove county, Ore.; thence along the Hunt grade to Summerville and Elgin; thence across the Blue Mts., through Union and Umatilla counties to Walla Walla, Wash., with a branch road to Athene, Ore. The incorporators are P. J. Taylor, F. A. Paddock and J. L. Storey. L. B. Reinhart, of Union City, is making surveys. (Dec. 16, p. 904.)

TENNESSEE CENTRAL.—This line, when completed, is to run from Harriman, Tenn., west 220 miles, via Rockwood, Crassville, Sparta, Woodbury, Murfreesboro and Nashville to Clarksville. The line is located from Harriman to Crassville, and locating engineers began work Dec. 18 on the line from Crassville to Nashville. Naugles, Holcomb & Co., of 335 Dearborn street, Chicago, have the contract, and are sub-letting from their office at Rockwood, Tenn. (Dec. 16, p. 904.) The work will be heavy, including one tunnel and several bridges and trestles. (Official.)

WEISER, IDAHO & SPOKANE.—Press reports state that an agreement has been made with the Oregon Short Line for 100 miles of 60-lb. rail for this line, from Weiser, Idaho, north to Lewiston. Grading was begun some months ago. (Sept. 9, p. 656.)

Electric Railroad Construction.

AKRON, O.—Hugh Berkeley informs us that he has not as yet organized a company to build the electric railroad in which he is interested. The name of the company will probably be the Alliance & Akron Electric RR. All of the right of way has been secured, and some of the stock subscribed. He expects to be ready to let contracts for 30 miles of the road about Feb. 1. When the entire road is completed, it will be 60 miles long and will run from Alliance to Cleveland. (Oct. 28, p. 787.)

ALLENTOWN, PA.—The South Bethlehem & Hellertown St. Ry. Co. is about to extend its line to Macungie. The company now operates five miles of road. Hon. Hugh E. Crilley is President, Allentown.

ANSONIA, CONN.—The Seymour Electric Ry. Co. has been organized in Ansonia to build an electric railroad in New Haven county, from Ansonia to Seymour and Beacon Falls, in all about 10 miles. H. Holton Wood, President of the Derby St. Ry. Co., is reported as interested.

BELLEVILLE, ILL.—The Belleville Electric RR. Co., now operating five miles of electric railroad, is to extend its line one-half mile in the city limits, and replace one and a half miles of single track road with double track, the material for which is bought. John A. Day, President and General Manager.

BIRMINGHAM, ALA.—Work to be done on the Behren's Park Car Line by the Birmingham Railway & Electric Co. will consist of changing two miles of single track to electric. Surveys are now in progress, and contracts are expected to be let by Jan. 10. The 11 cars recently bought from the St. Louis Car Co., St. Louis, Mo., which will be used on other lines of the company, will allow a surplus for the new line. J. B. McClary, Superintendent. (Dec. 23, p. 924.)

BOSTON, MASS.—The Boston Elevated Ry. Co. has bought property for contemplated improvements.

BRADFORD, PA.—The Olean, Rock City & Bradford Electric RR. is considering the advisability of extending the Congress St. branch to Lewis Run. The company's line, when completed, will be 21 miles. W. B. Ferguson, President.

BROCKTON, MASS.—We are officially informed that the Brockton, Bridgewater & Taunton Street Ry. Co. has no extensions of the line in contemplation. (Dec. 23, p. 924.)

BUCYRUS, O.—It is reported that F. C. Boyd, Vice-President of the New Haven Car Register Co., and C. W. Blakesley, of New Haven, are interested in building the proposed electric railroad between Bucyrus and Galion. Last March the Bucyrus, Galion, Crestline Electric RR. Co. was granted a franchise for a road between these cities. At that time W. E. Haycox, of Mansfield, was reported as interested.

CANTON, O.—The time for the completion of the line of the Stark Electric Ry. Co. has been extended six months by the Stark County Commissioners. The road the company is building will be 18 miles, between Alliance and Canton. (May 13, p. 349.)

CHARLESTON, ILL.—The electric railroad line which Forbes Holton, M. R. Williams and Crawford Fairbanks proposed to build from Terre Haute, via Mattoon, to Charleston, is probably the Charleston & Mattoon Electric RR., which was recently incorporated to build between the cities named, and having their names as among the incorporators. (Dec. 9, p. 886.)

CHATTANOOGA, TENN.—The new power house of the Chattanooga Rapid Transit Co., at Highland Park, has been completed. (Sept. 23, p. 285.)

It is announced that improvements on the road and in equipment to cost about $50,000 are contemplated for 1899.

CHICAGO, ILL.—The Chicago Electric Traction Co., formerly the Englewood & Chicago Electric Ry., is contemplating an extension from Blue Island to Harvey, the work to be done in the spring. The company already owns a franchise for a road into West Harvey to the terminal of the local horse-car line in that city. (Feb. 11, p. 111.) The C. E. T. Co.'s line is 21½ miles long. Storage batteries have been used for about two years. J. S. Bache, Chicago, is President.

The Chicago & Fox Lake Electric RR. Co., which was incorporated last July, is gradually securing right of way for its proposed road. The Council of Libertyville, Ill., has granted the company a 50-year franchise to build in that village. Frank N. Hills and F. W. Pringle, of Chicago, are two of the incorporators.

The People's St. Ry. Co. was incorporated Dec. 23, with a capital stock of $10,000. The incorporators are Joseph W. Latimer, Robert R. Reynolds and J. Guy Latimer.

The Lake St. Elevated RR., which recently secured a franchise for the Cicero & Harlem St. RR., from the Cicero Town Board, is to complete the mile of new track which is to be laid between 52d Ave. and Austin Ave. by April 15. This includes the incline from the elevated structure to connect with the surface road. (Dec. 16, p. 904; Dec. 23, p. 924.)

CITY OF MEXICO, MEX.—Active work has begun on the work of transforming the street car lines of the city to electric traction. The first line to be changed to electricity will be the one from Guadaloupe, three miles north of the city, to San Angel, about 12 miles south of the town. The line to San Angel will follow about the present course of the mule lines through the city, passing Chapultepec, Tacubaya and Mixcoac. The company hopes to have this first line ready for operation in about nine months. An entire new track is being made and 85-lb. rails will be laid. Three different styles of trolley poles will be used. Inside the city gates both the side-pole system, in which the trolley wires are suspended from wires strung across the street from pole to pole, and the single bracket iron poles, made by the National Tube Works, will be used. The power house will be of iron and brick, and have three boilers of the Babcock & Wilcox type, and three McIntosh & Seymour engines. The nominal h.p. of the plant is calculated at 1,200. The General Electric Co. will furnish the electrical plant, the cars being equipped with 70-h.p. motors. The J. G. Brill Co., Philadelphia, Pa., is now building 30 cars for the road.

DAYTON, O.—A contract is reported let to Philadelphia contractors for the building of the Dayton & Xenia Traction Company's lines, about 16 miles, between the cities named. J. M. Wilson, Chief Engineer, Dayton. (Dec. 9, p. 886.)

EAST LIVERPOOL, O.—Improvements on the line, including the building of a number of bridges, to the extent of $40,000, have just been completed.

EAU CLAIRE, WIS.—It is reported that the Chippewa Electric Ry. Co. is about to build a large power plant and also to bid for the contract for city lighting. C. E. Kelsey, President. (Oct. 7, p. 733.)

ELMIRA, N. Y.—It is again reported that the Elmira & Seneca Lake Electric Ry., which has been talked of for several years, is about to be built, and the contract has been let to the American Engine Co., of Bound Brook, N. J. The road is proposed to run from Watkins to Horseheads, where it will connect with the Elmira & Horseheads Ry.

GOSHEN, IND.—The Indiana Electric RR. Co. has completed its line from Elkhart to Goshen. This part of the line is known as the Goshen & Elkhart Electric RR. (April 1, p. 246.)

GREENSBURG, PA.—The Greensburg, Jeannette & Pittsburg Electric RR. has applied for right of way through Irwin for an extension of its line to North Irwin and Larimer. W. F. Sadler, President; C. L. Brenzer, Manager.

GREENWICH, N. Y.—The Greenwich & Schuylerville Electric RR. Co., which was chartered in 1895 to build an electric railroad between the cities named, is about to begin the work. The various occupants of lands through which the company proposes to build have been notified of the company's intention to begin. Martin Schenck is President, Albany, N. Y.

HAMILTON, O.—It is reported that a company to build an electric railroad between Cincinnati, O., and Rising Sun, Ind., has been incorporated, with the following as Directors: J. C. Hooven, G. A. Retschler, Geo. Helvey, Fred. Shaffer and Stanley Shaffer. The capital stock is $25,000.

J. E. Anderson, J. H. Shellenbarger, J. A. Walker, C. F. Elliott and J. C. Unzicker are reported as being the incorporators of the Hamilton & Eaton Electric RR. Co., reported in this column last week. The road they propose to build will be 25 miles long, and connect the cities named, and Camden, Summerville and Collinsville. (Dec. 23, p. 924.)

HARRISBURG, PA.—We are informed that the Harrisburg Traction Co. has no extensions of its line in contemplation. (Dec. 23, p. 924.)

HARTFORD, CONN.—W. E. Goodwin, of Elmwood, Conn., and F. C. Rockwell, of Hartford, are said to be interested in a projected electric railroad between Hartford and New Britain.

HOT SPRINGS, ARK.—On Dec. 12 Senator Berry, of Arkansas, and Representative Little introduced in their respective branches of Congress bills to extend the time for the completion of the Incline Ry. on West Mountain, Hot Springs Reservation. The bills provide that the time for the completion of the railroad, as provided by the act of Congress approved Dec. 21, 1893, be extended for a term of five years from the passage of the act. The bill was referred to the Committee on Public Lands.

KANSAS CITY, MO.—Joseph J. Hein, President of the East Side Electric RR. Co., informs us that the road will be put in first-class condition with elecric equipment. The contracts for the proposed work on the 2¼ miles of double track are to be let about the first of March. New bonds are to be issued to cover the cost of the work, and also for building a steel viaduct which is to cover the tracks of 16 railroads. The improvements will necessitate about six new cars. (Dec. 16, p. 905.)

KENOSHA, WIS.—J. W. Wagner, of Milwaukee, has made application for a franchise to build an electric street railroad in this city. He offers to build all the new bridges wanted.

LEAVENWORTH, KAN.—The Leavenworth Electric RR. has secured an injunction restraining the Atchison, Topeka & Santa Fe from interference with its tracks where they cross.

LOS ANGELES, CAL.—The subsidy of $9,000 asked by the Los Angeles Terminal Ry. for building the Alhambra electric branch line, has been secured from the city and the road is now an assured fact. T. E. Gibbon, Vice-President of the L. A. T. Ry., Los Angeles.

The matter of granting a franchise to the Los Angeles Terminal Ry., in Pasadena, on Colorado St., to Raymond Ave., is being objected to by the Los Angeles & Pasadena Electric Ry. Co. The application was considered by the City Trustees Dec. 14, and laid over for another week.

According to report, the Los Angeles & Redondo Ry., an 18-mile steam road, is to be changed to electricity. L. T. Garnsey, President, L. J. Perry, Los Angeles, General Superintendent.

NEW BRITAIN, CONN.—The Central Ry. & Electric Co. has in consideration several extensions of its lines. A. M. Young, President; E. H. Mather, General Manager.

NEW CASTLE, IND.—The commissioners of Henry County have granted a franchise to the New Castle Electric Ry. Co., the incorporators of which are E. R. Phillips, R. Wisehart, T. Gordon, J. F. Thompson and D. P. Jennings. Work on the line is to begin before October, 1899.

NEW HAVEN, CONN.—According to report, the consolidation of all the street railroads in New Haven is contemplated. Thomas M. Waller, James D. Dewell, Israel I. Kelsey, Harrison Wagner and W. B. Ferguson, representatives of different street railroads in New Haven, have petitioned the General Assembly for an act of incorporation permitting them to form a new street railroad company, and to build extensions to the present lines. The consolidation would embrace the New Haven St., the New England St., the Winchester Ave., the West Shore, and the Fairhaven & Westerville companies.

NORTON, MASS.—The Mansfield & Norton St. Ry. has completed its line between the cities named, and the road was officially opened on Dec. 21. This completes, with one exception, the Bristol county system of electric lines entering Norton. The Norton & Attleboro is completed and in operation, and the Mansfield & Eastern line will be opened early in the spring. Franklin Mead, President, 8 Congress St., Boston.

OSHKOSH, WIS.—The Citizens' Traction Co. of Oshkosh has secured the right of way along the Ridge road between that city and Neenah. The company has 60 days in which to accept the franchise, and if accepted agrees to pay a forfeiture of $4,000 if the road is not completed by Aug. 1 next. The plan is independent of the Tilotson Interurban road along the lake shore.

PITTSBURGH, PA.—The Wilkensburg & East Pittsburgh St. Ry. Co. has made application for an extension of its lines through several streets in the Borough of North Braddock. The Council of the borough, in consideration for the franchise, demands that the railroad company shall pave the streets upon which its tracks are laid, and build three steel bridges over hollows that cut the said streets off. Each of these bridges will be about 300 ft. long. The company has secured right of way through Rankin and East Pittsburgh. It is believed to be a part of the Monongahela Traction Co., of which A. W. Mellon is President. (Dec. 2, p. 869.)

PITTSFIELD, MASS.—The Pittsfield St. Ry. Co., according to report, is about to make extensions of its line. The capital stock of the company was recently increased for this purpose. J. Tucker, President. (April 15, p. 285.)

QUAKERTOWN, PA.—The extension to be built by the Quakertown Traction Co. will be 26 miles of single track from Perkasie, via Sellersville and Doylestown, to Richlandtown. The plans are now being prepared, and it is expected that the contracts for the new work will be let about February or March. Four bridges, two iron and two wooden, will be built on the line. The improvement will necessitate about eight new open and four closed cars. New securities will be issued to meet the expenditures. C. Taylor Leland is President; Wm. D. Freed, Vice-President; A. B. Walp, Treasurer. Samuel R. Kramer, J. G. Mayer and Andrew Hartzel are Directors, with the above named. (Dec. 23, p. 924.)

QUINCY, MASS.—The Quincy City Council has granted permission to the Quincy & Boston St. Ry. to remove its tracks on Adams St. to a new location on Allyne St. The Weymouth selectmen have granted a franchise to the company to build on Commercial, Front, Broad and Washington Sts. (Nov. 11, p. 821.)

SACO, ME.—The contract for building and equipping the Saco River Electric RR., which will be about 11 miles long, between Saco and Bonny Eagle, has been given to Isaac A. Walker & Son, of Philadelphia, Pa. The proposed equipment will be 20 cars, mentioned in the Car Building column. The office of the company is 432 Tremont Building, Boston.

SAN DIEGO, CAL.—The San Diego Electric Ry. is contemplating double tracking the line on Logan and National Aves. The track on Logan Ave. will be 2,100 ft. long.

SPRINGFIELD, O.—It is reported that F. L. Sparrow is the representative of a Chicago company which proposes to build an electric railroad between Springfield and Decatur.

VANCOUVER, B. C.—An 11-year lease has been granted to the British Columbia Electric Ry. Co. for a double track line over Davie St. to English Bay. J. Bentzen, Manager. (Dec. 9, p. 887.)

VICKSBURG, MISS.—Geo. F. McCullough of Richmond, Ind., is reported as having been placed in charge of the building of the Vicksburg RR. Power & Manufacturing Co., the franchise of which is owned by J. C. Shaffer, Marquette Building, Chicago, Ill. (June 24, p. 467; Nov. 18, p. 839.)

WALTHAM, MASS.—The Boston & Lexington St. Ry. Co. has asked permission for a new line of electric street railroad on Main St. to Lexington St., to the Lexington line. Chas. W. Smith is reported as being a director in the company. The proposed road is also to run from Waltham, through the towns of Weston, Lincoln, Concord, Acton and Littleton. It is said that money for the new enterprise is already subscribed, and as soon as right of way has been granted the work is to be begun.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the dates named:

June 30.		1898.	1897.	Inc. or Dec.
Cincinnati, Hamilton & Dayton.				
12 months	Gross	$4,908,563	$4,627,352	I. $281,211
12 "	Net	1,487,215	1,398,670	I. 88,545
Oct. 31.		**1898.**	**1897.**	**Inc. or Dec.**
Baltimore & Ohio.				
1 month	Gross	$2,459,725	$2,384,215	I. $75,510
1 "	Net	641,121	690,091	D. 48,970
4 months	Gross	9,803,454	9,435,287	I. 368,167
4 "	Net	2,475,861	2,657,014	D. 181,153
Nov. 30.		**1898.**	**1897.**	**Inc. or Dec.**
Atchison, Topeka & Santa Fe.				
1 month	Gross	$4,008,903	$3,889,246	I. $119,657
1 "	Net	1,434,149	1,373,663	I. 60,486
5 months	Gross	17,200,859	16,816,651	I. 384,207
5 "	Net	4,968,131	5,113,009	D. 144,877
Central of Georgia.				
1 month	Gross	$621,352	$604,278	I. $17,073
1 "	Net	261,654	277,183	D. 15,528
5 months	Gross	2,596,105	2,463,560	I. 132,545
5 "	Net	982,142	953,390	I. 28,751
Chicago, Milwaukee & St. Paul.				
1 month	Gross	$3,500,448	$3,328,446	I. $172,001
1 "	Net	1,595,299	1,470,416	I. 124,882
5 months	Gross	16,826,070	15,613,198	I. 1,212,871
5 "	Net	6,915,934	6,278,571	I. 637,363
Cincinnati, New Orleans & Texas Pacific.				
1 month	Gross	$419,672	$335,482	I. $84,190
1 "	Net	160,294	122,553	I. 37,741
5 months	Gross	2,094,908	1,599,333	I. 495,575
5 "	Net	749,971	535,897	I. 214,074
Northern Central.				
1 month	Gross	$643,537	$615,186	I. $28,351
1 "	Net	211,960	202,849	I. 9,111
11 months	Gross	6,050,407	6,146,263	D. 95,856
11 "	Net	1,721,639	1,902,637	D. 180,998
Northern Pacific.				
1 month	Gross	$2,826,096	$2,640,483	I. $185,613
1 "	Net	1,754,292	1,696,709	I. 47,583
5 months	Gross	12,777,467	11,604,998	I. 1,172,469
5 "	Net	7,452,914	6,534,259	I. 918,655

Nov. 31.		1898.	1897.	Inc. or Dec.
Pittsburgh, Cincinnati, Chicago & St. Louis.				
1 month	Gross	$1,473,690	$1,384,294	I. $89,396
1 "	Net	472,635	524,387	D. 51,752
11 months	Gross	14,754,186	13,580,709	I. 1,173,477
11 "	Net	4,283,497	4,307,036	D. 23,539
St. Louis & San Francisco.				
1 month	Gross	$660,679	$612,568	I. $48,111
1 "	Net	283,517	269,834	I. 13,682
5 months	Gross	3,098,682	3,066,033	I. 32,648
5 "	Net	1,305,476	1,399,353	D. 93,877
Southern.				
1 month	Gross	$2,261,874	$2,019,707	I. $242,167
1 "	Net	820,720	722,159	I. 98,561
5 months	Gross	10,690,275	9,389,974	I. 1,300,301
5 "	Net	3,570,815	3,047,072	I. 523,743
Wabash.				
1 month	Gross	$1,212,451	$1,061,231	I. $151,220
1 "	Net	298,455	268,894	I. 29,561
5 months	Gross	6,176,729	5,757,566	I. 419,163
5 "	Net	1,700,849	1,933,239	D. $232,490

Dec. 31.		1898.	1897.	Inc. or Dec.
New York Central & Hudson River.				
3 months	Gross	$12,150,000	$11,734,149	I. $415,851
3 "	Net	4,452,000	4,273,970	I. 178,030
6 months	Gross	23,544,397	24,013,089	D. 458,701
6 "	Net	8,828,214	9,030,444	D. 202,230

ALLEGHENY & KINZUA.—In the case of this company against Camille Widerfield & Co., at Pittsburgh, Dec. 22, a petition was filed by the defendants asking that the marshal's sale of certain property levied upon for costs, amounting to $514, be stayed. The reasons given were that the property is in the hands of the receiver. This road ceased operations early this year. It went into the hands of a receiver in February, 1892.

ATCHISON, TOPEKA & SANTA FE.—C. P. Huntington, President of the Southern Pacific, announces that arrangements have been made to give the Atchison trackage rights between Mojave, Cal., and Bakersfield, which completes the connection of the Atchison with the San Francisco & San Joaquin Valley, recently bought. (Dec. 16, p. 905.)

BALTIMORE & OHIO.—Holders of Pittsburgh & Connellsville receivers' certificates of Jan. 1, 1897, and of B. & O. equipment company bonds of July 1, 1896, are notified that these will be redeemed in cash on Jan. 1, 1899, or extended, payable at the option of the receivers or the court upon five days' notice, with interest at 5 per cent.

Judge Morris of the United States Court at Baltimore, Md., on Dec. 20, authorized the trustees under the collateral trust mortgage of the B. & O., to institute suit to foreclose the mortgage and to sell the bonds of the Parkersburg branch. This mortgage was executed July 10, 1879, and secures the issue of $3,000,000 of 6 per cent. bonds.

A minority of holders of stock of the Central Ohio refuse to accept the terms offered by the B. & O. managers. Messrs. Wm. H. Conklin, Derrick Fahnestock, John Black and Harry Fahnestock have issued circular letters advising against the acceptance of the proposition. (Dec. 9, p. 887.)

CENTRAL PACIFIC.—The plan of reorganization is said to be practically matured and will be issued in a few weeks. As reported, a proposition has been made for the lease of the road on the basis of a guaranteed dividend on the stock, with a low rate bond, probably 3½ per cent., to take up existing liens.

The Southern Pacific gives notice that on and after Jan. 3 it will pay to persons presenting outstanding certificates of stock of the C. P. one-half of one per cent. of the par value of the stock represented by such certificates. (Dec. 2, p. 870.)

CHICAGO & OHIO RIVER.—This property was sold at auction Dec. 16 to the Peoria, Decatur & Evansville. The road was sold to the same company in August, 1893, but the sale was declared void. It extends from Olney, Ill., to Sidell, 85.42 miles. (Dec. 2, p. 870.)

DALLAS TERMINAL RAILWAY & UNION DEPOT.—At a special meeting at Dallas, Tex., Dec. 22, it was decided to change the charter name of this company to the Dallas, Fort Worth & Gulf, and to issue $1,000,000 of 5% bonds for building the extension to Fort Worth, 32 miles, and for other improvements. (Dec. 23, p. 925.)

DENISON & NORTHERN.—Following the order of the United States Circuit Court, this property was to have been sold Oct. 29, but on the day before the sale the company offered a supersedeas bond to the Court, which was approved by the clerk, staying the sale until the case could be heard in the United States Court of Appeals. The bond was approved against the protest of the attorneys for the creditors, who took the matter before Judge Springler, Chief Justice of the United States Court of Appeals for I. T., and he has sustained their objections to the bond. (Nov. 18, p. 840.)

ILLINOIS CENTRAL.—Arrangements have been completed to run trains through St. Louis, Mo., to Martin, Tenn., and thence over the Nashville, Chattanooga & St. Louis to Nashville. The usual agreement for such service governs. (Official.)

NEW YORK, LACKAWANNA & WESTERN.—Redmond Kerr & Co. of New York have bought $4,000,000 terminal 4 per cent. bonds, the remainder of the authorized issue of $5,000,000 bonds. These are guaranteed, principal and interest, by the D., L. & W.

PECOS VALLEY & NORTHEASTERN.—The Texas Railroad Commission have been asked to approve the issue of $627,000 bonds on this new company's line, from Amarillo southwest to the New Mexico line.

PENNSYLVANIA.—The so-called Clover Creek RR., which is simply an extension to the Clover Creek Limestone Company's quarries in Blair county, Pa., has been bought by the Manor Real Estate & Trust Co. of Allegheny county, Pa. The line is unincorporated and is operated as a branch of the Pennsylvania.

ST. LOUIS, KANSAS & SOUTHWESTERN.—Judge John A. Williams, in the Federal Court at Little Rock, Ark., Dec. 20, confirmed the sale of this road at Arkansas City, Oct. 22, to Samuel Baker of Hamilton, Ont., representative of the creditors, for $150,000. The line runs from Arkansas City to Anthony, 59.35 miles. It went into the hands of a receiver Nov. 28, 1896. (Oct. 28, p. 788.) The Kansas Southwestern Ry. Co. has been incorporated in Kansas with a capital stock of $8,000,000, as successor to the St. Louis, Kansas & Southwestern. The Directors are: Samuel Barker, Patrick M. Banker, John S. Hendrie and Wm. M. Long of Hamilton; John Penman, Paris, Ont.; James N. Young, Albert A. Newman, Arkansas City, Kan.; W. E. Blackburn, Anthony, Kan., and James Glover of Bluff City, Kan. The central office is to be at Kansas City, Mo.

ST. PAUL & DULUTH.—Pursuant to the plan of reorganization, proposals are invited for the sale of the company's shares of preferred stock at a price not exceeding par, at the company's office, 32 Nassau St., New York, before noon on Jan. 6, 1899.

WEST VIRGINIA & PITTSBURGH.—Brown, Shipley & Co., in a circular to the holders of certificates of deposit for the first mortgage bonds recommend the acceptance of the following proposition by which the road will be operated under lease by the reorganized Baltimore & Ohio:

A lease shall be made providing for a rental from a date not later than April 1, 1899, equal to 4 per cent. per annum on the mortgage, with a provision to insure the appropriation of this rental to the payment of interest on the bonds. In consideration of this agreement, the reorganized Baltimore & Ohio shall have the option for five years, from April 1, 1899, to purchase the bonds at par and accrued interest on sixty days' notice. To make the agreement effective, all the certificates of deposit, or such lesser amount as the reorganization managers shall accept, must sign on or before January 7 next the written acceptance of the proposed arrangement. Provision is made for acceptances to be received by Brown Bros. & Co., of New York.

WISCONSIN CENTRAL.—Mark T. Cox, of the firm of Robert Winthrop & Co., New York, has taken appeal from the recent order of Judge Jenkins, authorizing a new issue of receivers' certificates amounting to $1,000,000.

Holders of first mortgage bonds of the Chicago, Wisconsin & Minnesota and the Milwaukee & Lake Winnebago are requested to communicate with F. J. Lisman & Co., 30 Broad St., New York, with a view to protecting their interests.

WISCONSIN, MICHIGAN & NORTHERN.—This company's property is reported sold to the Ann Arbor. It was recently incorporated as successor to the Wisconsin & Michigan, and runs from Peshtigo, Wis., north 57.1 miles to Faithorn Junction, Mich. An extension is building from Faithorn Junction north 16 miles to Quinnessee, and it is proposed ultimately to extend the line to Duluth, Minn. The Ann Arbor Co. will connect with this road by steamers from Frankfort across Lake Michigan to Marinette, whence connection is made with Peshtigo over the tracks of the Chicago, Milwaukee & St. Paul. It is expected that this connecting link will be built in the near future. (Nov. 25, p. 854.)

Electric Railroad News.

AKRON, O.—The property of the Akron St. Ry. & Illuminating Co. has been appraised at $932,000. The date for the sale of the property is set for Jan. 28 at Akron. It is believed that the Reorganization Committee will buy the property in. The plan of reorganization made public, capitalizes the new company at $2,000,000. The present outstanding indebtedness is $1,200,000. Bonds to the amount of $300,000 are to be issued to provide for improvements in the system, among which is an entire new equipment of cars. The receivers were appointed in January, 1898. Samuel Thomas, 80 Broadway, New York, is President.

CHICAGO, ILL.—By the terms of the recent loan of $4,500,000, the Northwestern Elevated RR. is practically reorganized. There is to be an issue of $5,000,000 5 per cent. gold 30-year bonds; $5,000,000 non-cumulative five per cent. preferred stock and an equal amount of common stock. So far there has been about $6,000,000 spent on the building of the line. As a guarantee for the loan the company will at once continue the building and endeavor to complete it before Jan. 1, 1900. (Dec. 16, p. 906.)

CLEVELAND, O.—We are officially informed that the consolidation and sale of the street railroads in Cleveland is only talk, nothing definite as yet having been done.

DEDHAM, MASS.—William Wragg, Deputy Sheriff of Norfolk County, informs us that he has attached all the real estate and personal property of the Norfolk Southern St. Ry. Co. in the towns of Walpole and Foxboro. The company operates seven miles of electric road. The plaintiffs are Wendell & McDuffee, of New York. The officers are J. R. Ballard, President, and T. S. Robinson, Treasurer.

DETROIT, MICH.—The Rapid Ry. has acquired control of the Mt. Clemens & Lakeside Traction Co. of Mt. Clemens. The Detroit & River St. Clair RR., now building, has also been secured by the Rapid Ry. The Mt. Clemens & Lakeside Traction Co. is a consolidation of the Mt. Clemens & Lakeside Construction Co., and the Mt. Clemens Street Ry. Co., Ltd., the capital stock of which is $100,000. The Rapid Ry. was chartered in 1894 with a capital stock of $250,000, all of which has been issued. The company operates 17 miles of electric road. Cornelius J. Reilly is President. Many improvements are contemplated, according to report.

ST. LOUIS, MO.—Attorney General E. C. Crow filed in the Supreme Court Dec. 27, quo warranto proceedings against the Lindell Ry. Co. to deprive it of the franchise granted it recently by the Municipal Assembly of this city for extensions. The Attorney General holds that the extension franchise is in direct conflict with what is known as the "Parallel Law," enacted in the sixties, prohibiting the granting of any franchise for the building of a street railroad within three blocks of an existing line of street railroad. (Oct. 21, p. 769.)

The sale of the National Ry. of Chicago was completed in Chicago Dec. 19 at $120 a share. The sale is believed to be the first step toward the consolidation of all the street railroads in St. Louis with which Alexander Brown & Sons, of Baltimore, are interested.

TRAFFIC.

Traffic Notes.

The railroads carrying soft coal from the Ohio fields to Lake Erie have made a reduction in rates, the Columbus, Hocking Valley & Toledo being the first to reduce. To Michigan the reduction is 20 cents a ton, from $1.15 to 95 cents; to Chicago it is 25 cents, and to Columbus the rate is reduced from 70 cents to 50.

The British Board of Trade has authorized a change in the winter load line for grain carrying vessels. This will enable ships loading at New York to carry considerably larger quantities of grain in the winter than heretofore, increasing in some cases the income of a large vessel as much as $1,500 or $2,000 on a single trip. Baltimore interests are complaining of this action; they claim that in their harbor, 160 miles from the ocean, there is so much fresh water that a vessel loaded six inches deeper would be on a par with vessels from New York by the time it reached the latitude of New York.

Baltimore & Ohio Receivers on the Freight-Rate Situation.

Chairman Knapp of the Interstate Commerce Commission has received a letter from Receivers John K. Cowen and Oscar G. Murray of the Baltimore & Ohio, announcing that after Jan. 1, 1899, that road will maintain scrupulously the published rates filed with the Commission, and will appeal to the Commission for aid in cases of railroads failing to maintain rates to the detriment of the interests of the Baltimore & Ohio. The letter says in part: Within the territory north of the Ohio River and east of the Mississippi the railroad carriers are transporting the larger part of the interstate traffic at rates less than those shown on the published tariffs filed with your Commission, which are by statute the only lawful rates. * * * Only by insuring the uniform charging of the published rates can the just equality of service and of charge required by law be secured either between persons or between localities.

Heretofore the Baltimore & Ohio and its competitors have maintained joint agencies or associations under various agreements intended to act as a restraint upon each carrier and to prevent the secret cutting of rates on competitive traffic. It has been the practice for each carrier to report to the joint agency or association any departure from published rates by a competing carrier, to the end that the facts might be fully ascertained and the unfair competition stopped.

The Supreme Court of the United States has now finally determined that the so-called Anti-Trust Act applies to railroad carriers, and even an agreement to secure the observance of the restraints imposed by the act to regulate commerce is illegal. Without some impartial body to investigate the complaints of one competing carrier against another and to check illegal rate-cutting if found to exist, it will be practically impossible for the railroad carrier alone to prevent that form of competition between them, however earnest the great majority of the carriers may be to stop it.

The Interstate Commerce Commission commands the respect of the railroad carriers for its impartiality, and its power to stop all illegal practices far surpasses any association. Carriers should seek to aid the Commission by reporting to the Commission any departure from published rates.

The receivers of the Baltimore & Ohio Railroad Company will maintain, on and after Jan. 1, 1899, the rates, fares and charges shown on the tariffs published and filed with the Commission, as required by law.

We believe that all, or nearly all, of the railroad carrriers within the territory above mentioned will likewise maintain their published tariff rates from that date. To prevent a relapse, however, to the conditions now existing, it is necessary that no important carrier shall long depart from the published tariff of rates. Should such a departure occur, to the detriment of the interests in our charge, we shall invoke the aid of the Commission to stop it. We hope and believe that many other carriers will do the same. In the anticipation that the other railroad carriers formerly associated with the Baltimore & Ohio in traffic associations will adopt the course decided on by us, we have sent to each such carrier a copy of this letter.

It is reported from Chicago that the Cleveland, Cincinnati, Chicago & St. Louis will make an announcement similar to the foregoing.

Chicago Traffic Matters.

Chicago, Dec. 28, 1898.

Chicago railroad traffic men are in a waiting state just now; they are waiting to see how well the other fellow will keep his ante-New Year's promise to maintain all tariffs after next Sunday. All classes of freight are still being taken at secret rates. East it is the provision and grain rates; west it is the live stock and merchandise, with provision rates from the Missouri River packing points that are demoralized. With these low rates in force, we have coincidently an almost unprecedented amount of traffic on all lines, and active soliciting is no longer necessary. All the roads are making large earnings and are spending money for new equipment. Within the last few weeks two eastbound and three westbound lines have ordered 110 locomotives, to say nothing of the contracts for thousands of new cars.

Local traffic men are not giving the Baltimore & Ohio and Big Four managements much credit for their recent public declarations of their intention to maintain all rates and to inform the Commission of violations of the law detected among other lines. This feeling of suspicion is the natural one that is always alive in the breast of competitors; but there does not seem to be any very good reason to doubt the sincerity of these two companies in their letters to the Interstate Commerce Commission. Undoubtedly they will have many opportunities of proving their loyalty to the laws.

At a general conference last week of the executive officers of the roads east and west of Chicago it was agreed that on Jan. 2 the export corn rate from trans-Missouri territory to New York shall be 17½ cents, and from points west of the Mississippi and east of the Missouri River the rate will be 15 cents. This will abolish the alleged discrimination in export corn tariffs against the roads carrying by way of Chicago.